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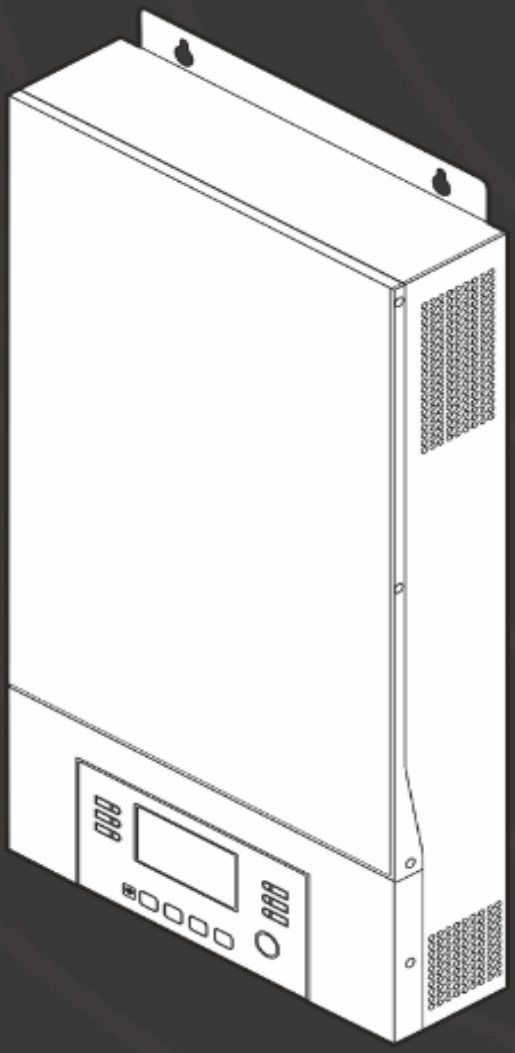

User Manual

Product name	AX M2 Series 3-5kW
Item number	SLAGVTSI3K0W1024 SLAGVTSI5K0W1048
Type	Solar inverter 3-5 kW
Revision	V1.9
Language	EN

CE

Components of the User Manual

- User manual

Use

- This user manual must be stored in direct proximity to the solar inverter.
- This user manual is a component of the UPS system.
- Always refer to the complete original version (or the translation of the original) of this user manual.

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User Manual

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1. Safety

1.1 Safety instructions

Pictogram

⚠ SIGNALWORD

Nature and source of danger.

Consequences of non-observance of instructions.

- Actions to prevent danger.

1.2 Symbols used

⚠ DANGER

Indicates a hazardous situation.

The non-observance of safety regulations leads to death.

⚠ WARNING

Indicates a potentially hazardous situation.

The non-observance of safety regulations can lead to death or severe injury.

⚠ ATTENTION

Indicates a potentially hazardous situation.

The non-observance of safety regulations can lead to injury.

CAUTION

Indicates a potentially hazardous situation. The non-observance of the safety regulations can lead to property damage.

1.3 General safety instructions

General accident prevention measures

- Adhere to the current safety regulations of your plant.
- Never remove covers, safety equipment or other components from the solar inverter!
- Report defects and irregularities immediately to the responsible persons!

User Manual

- Read the User Manual before working with the solar inverter.
- Always refer to the complete original version of this User Manual. Incomplete versions or copies of individual pages do not convey all the information from the User Manual.
- Observe the safety instructions and danger indications in this User Manual.

Operating personnel

- It is only permissible that the installation and connection of the solar inverter is performed by trained electricians in accordance with the corresponding safety regulations, standards and the domestic guidelines!
- The solar inverter can be operated by persons without prior experience.
- Ensure that the location of the solar inverter is sufficiently illuminated.
-

Permissible operation and environmental conditions

- The solar inverter can only be assembled on stable and weight-bearing walls (e.g. cement, brick).
- The device may only be installed on a clean, dust-free and dry site.
- The solar inverter must be installed in a well-ventilated environment, far from water, inflammable gases and corrosive agents.
- In any case, it must be ensured that the installation site has sufficient air circulation for the cooling of the device.
- Mind the distances between several solar inverters and other devices located in the immediate vicinity do not negatively influence the solar inverters (e.g. strong waste heat).
- The solar inverter is only permitted to be operated in interior rooms. It is not intended for use in dusty or corrosive environments or in explosive atmospheres.

- All the limits listed in the technical data regarding the environmental and operation conditions shall be observed to guarantee error-free operation.

Design modifications

- No design modifications can be undertaken on the device without the knowledge of EFFEKTA GmbH.
- The device can only be operated with original replacement parts from EFFEKTA GmbH or with replacement parts that comply with the requirements of EFFEKTA GmbH.

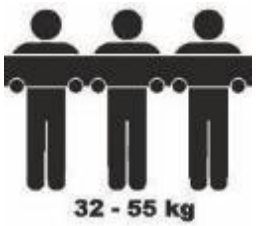
1.4 Known residual risks

1.4.1 Safety instructions for storage

Storage temperature: -15°C~ 60°C,

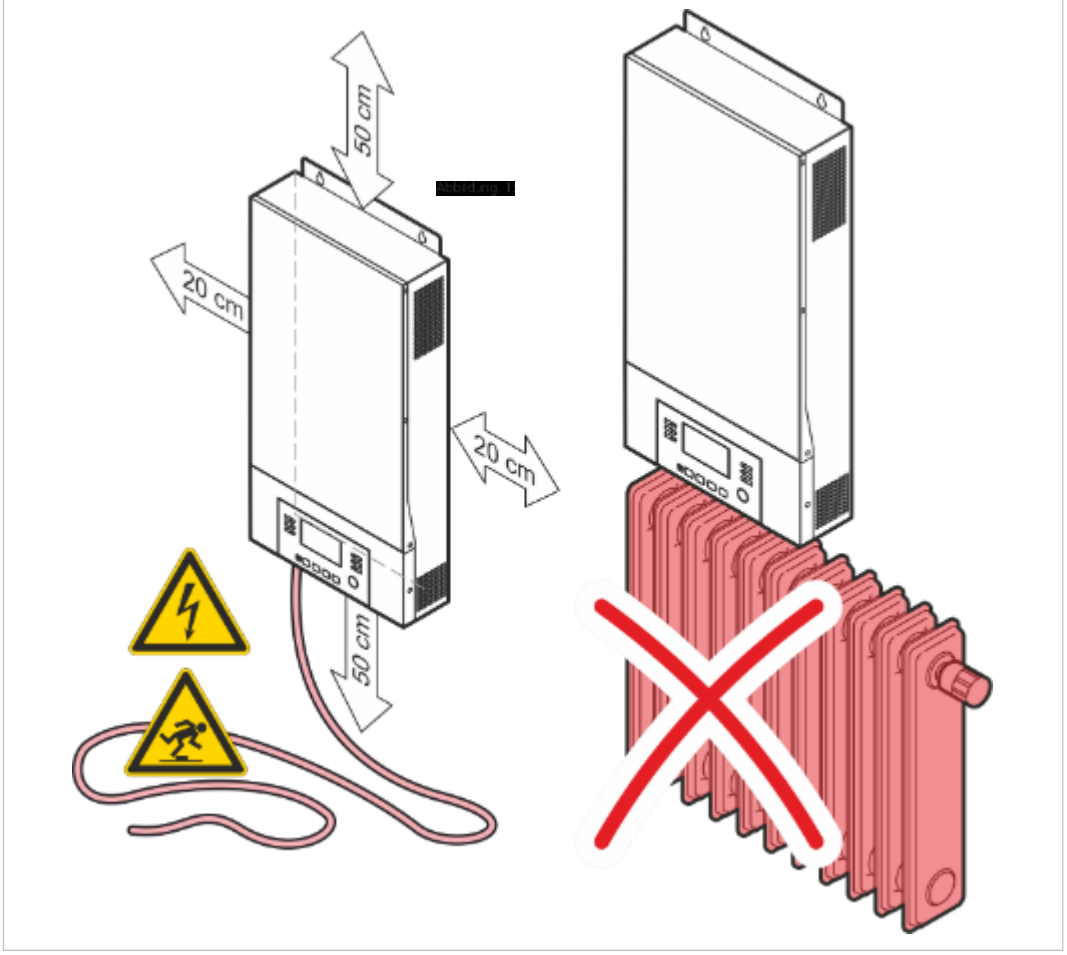
5% to 95% relative humidity (non-condensing)

1.4.2 Safety instructions for transport

	Heavy loads up to a maximum of 18 kg can generally be carried by one person.
	Heavy loads up to a maximum of 32 kg should be carried by two persons whenever possible.
	Heavy loads up to a maximum of 55 kg can only be carried by three persons.
	Loads up to 55 kg must be lifted with technical aids or transported (e.g. fork lift).
	When transporting heavy loads over 18 kg, technical aids must be used for inclines of 10%.

1.4.3 Safety instructions for installation

Figure 1: Safety instructions for the installation

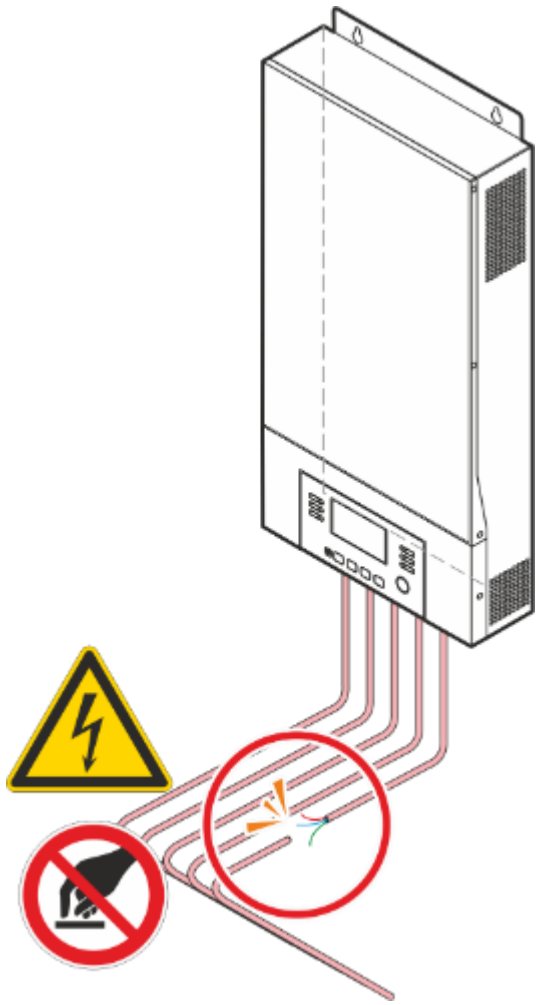


- Fire hazard in event of improper use!
  - Never install the solar inverter in an explosive and/or unventilated area. Pay attention to the observance of the specified temperature range for the environment.
  - Ensure the necessary air circulation.
  - The solar inverter must not be positioned near sources of heat.
  - Always note the operating position during the installation.

- Maintain the necessary minimum distance to neighboring equipment or walls for the purpose of ventilation.
- Risk of injury from electric arcs!
  - Never install or operate the device in a damp environment.
  - As a rule, keep liquids away from the device.
  - After installing the device, condensation effects can occur as a result of great temperature differences. That is why an acclimation period of at least 2 hours should be maintained before further steps can be undertaken. Make sure that the temperature compensation is concluded and that the interior and exterior condensed areas have dried completely.
- Risk of accident from improperly executed installation work!
  - Do not stand on the device!
  - Install the solar inverter in an easily accessible location.
  - Place the cable so that it cannot be stepped on or tripped over.
  - The electrical connection must be carried out in accordance with the wiring diagram by an authorized electrician as per VDE and the current EVM regulations!
  - In normal operation, the device must not be operated with a dismantled cover!

1.4.4 Safety instructions for operation

Figure 2: Safety instructions for operation

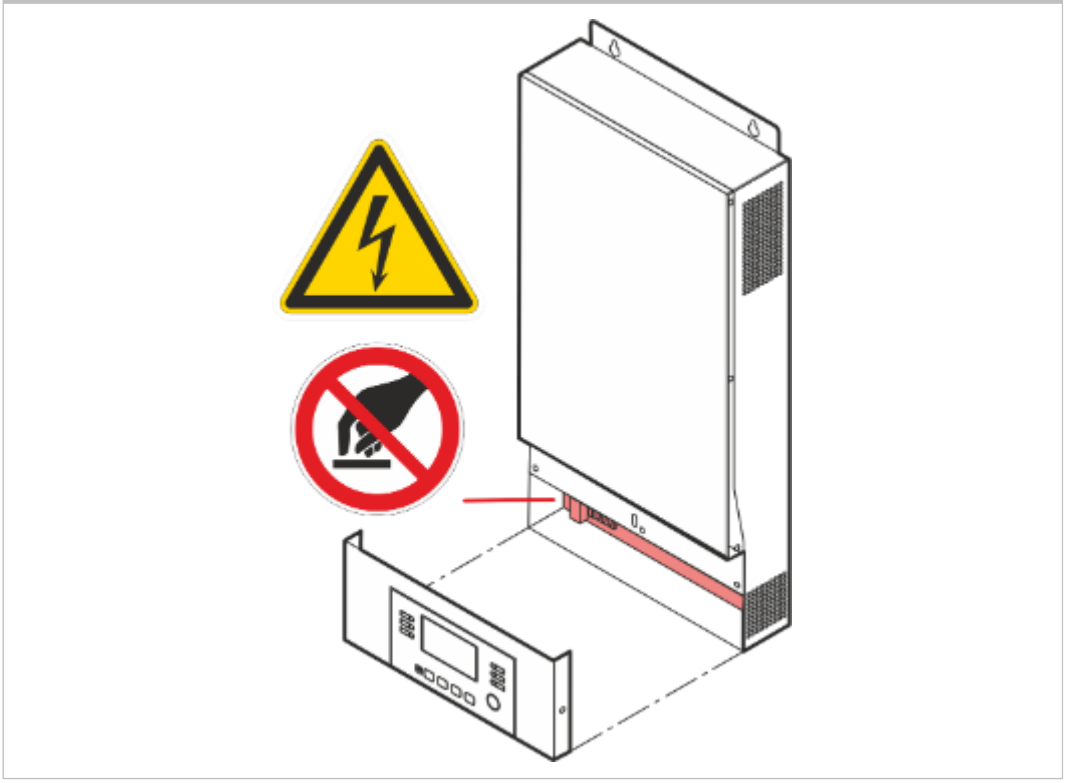


- Danger from suddenly occurring disturbances!
  - Report the occurrence of disturbances immediately to the responsible person!
- Risk of injury from connected power sources (battery feed)!
  - The output terminals are energized by the battery feed in the event of of a failure of the on-site power supply (e.g. power outage)!
  - In normal operation, the device must not be operated with a dismantled cover!

    The solar inverter should not be disconnected from the on-site energy supply when properly operated (normal operation) The batteries cannot be charged if the power supply is disconnected. The solar inverter can only function properly with charged batteries.

1.4.5 Safety instructions for maintenance and repairs

Figure 2: Safety instructions for maintenance and rapairs



- High and low voltage: risk of injury!
  - The battery circuit is not disconnected from the input voltage. Hazardous voltages can occur between the battery poles and the ground. Confirm that voltage is not present before touching!
  - Before commencing with maintenance or repair work on the device, you must disconnect the device from the supply network and the battery feed.

- Residual energy: risk of injury!
  - Even after the device has been disconnected from the power supply, the components of the solar inverter are still energized (battery feed!) and are dangerous!
  - Before performing maintenance and/or service work, disconnect the batteries from the power supply and ensure that there is no electricity and no dangerous voltage on the terminals of high-performance condensers, such as e.g. BUS condensers!
- Improper repair work: risk of injury!
  - Improper repair work can lead to unexpected behavior of the solar inverter! This can cause injury to persons.

- You can only use isolated tools in accordance with IEC 60900!
- Wrist watches, jewelry and other metal objects must be removed!
- Maintenance and repairs can only be performed by trained specialists.
- Only persons who are sufficiently familiar with batteries and the necessary safety measures are permitted to switch batteries and monitor the operation. Unauthorized persons must be kept away from the batteries.
- Always install the same number and the same battery type when replacing the battery.
- Replace the fuse only with one of the same type and current strength!

- Accumulators and their connections can cause electrical shock. Risk of injury!
  - If there are short circuits on the accumulators, touching the current-bearing parts can cause severe burns.
  - Accumulators should never be linked to heat sources and must not be near flames. There is a risk of explosion!

1.4.6 Safety instructions for disposal

- High and low voltage: risk of injury!
  - Batteries can cause electrical shock and high short-circuit currents.
  - Do not touch the electrical components!

- High-performance batteries: risk of injury!
  - Never dispose of batteries by burning. This can cause the batteries to explode.

- Do not disassemble the solar inverter! Deliver the solar inverter intact to a licensed private or public waste collector.

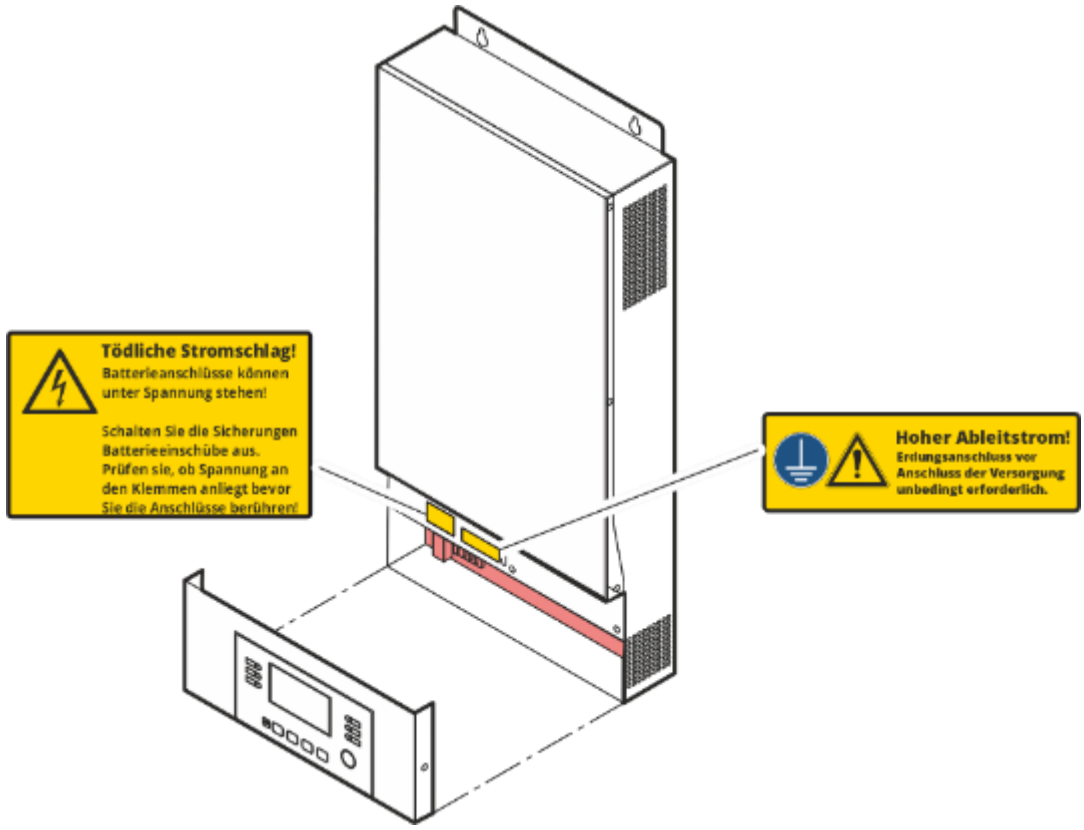
- You must not open the batteries!
  - There is a risk of corrosive effects for skin and eyes

- Defects or degenerative accumulators must be disposed of in an environmentally safe manner.
  - Under no circumstances, dispose of the accumulators in the house waste.
  - Observe the local regulations.

1.5 Hazard labels

All hazard labels (stickers, signs) affixed to the solar inverter must be observed. If the hazard labels are defective, you must arrange for the immediate replacement.

Figure 3: Hazard labels → Safety instructions for disposal



Warning labels	Meaning	Actions
	Warning of dangerous voltage	Battery connections can be energized! Switch off the battery insert fuses. Check if there is voltage on the terminal before touching the connections!
	Warning of dangerous voltage	High leakage current! A ground connection is absolutely necessary before connecting to the supply.

1.6 Proper Use

The device is designed according to the latest technology and the recognized safety rules. The solar inverter must only be used in a technically error-free condition and properly, with full awareness of safety regulations and the dangers, in observance of the user manual. Disturbances that affect the safety, in particular, must be immediately eliminated.

This multi-function solar inverter/charging unit can supply all types of devices in residential and office settings with power, such as, for example, tubular lights, ventilators, refrigerators and air conditioning systems and much more. Various generators, solar cells and accumulators can be used as power sources alongside the usual power supply.

Another use or one extending beyond this is considered improper use. The manufacturer/supplier is not liable for the resulting damages. The user alone bears the risk. A different use is only permissible with written consent from EFFEKTA GmbH.

The solar inverter is exclusively designed for commercial use.
The observance of this User Manual and the adherence to inspection and maintenance work also fall under proper use.

This User Manual contains, among other things, general safety instructions and well as specific safety instructions for certain actions or sources of danger regarding certain components. It is necessary that you read and follow all warning instructions in this description.

In addition to this description, you must observe the following regulations:

- the currently valid rules and regulations for accident prevention in the respective country and the installation site.
- the currently valid rules for skilled and safety-related work in the respective country and the installation site.
- the currently valid requirements for the power supply in the respective country and the installation site.

1.7 Foreseeable misuse

Operation in extreme environment

The device is not for use:

- in explosive;
- in dusty or damp;
- in radioactive or;
- in biologically or chemically contaminated atmosphere;

- Supply of vital systems or equipment

Application for vital uses, implementation in hospitals or in direct patient care, operation in areas with risk of fire or explosion and in areas with extreme heat/cold or extreme humidity;

conceptualized!

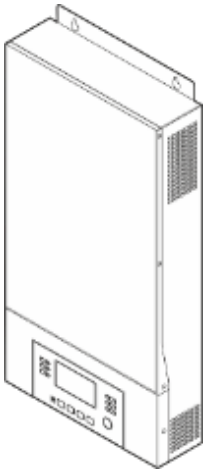
Non-observance of safety instructions

The safety instructions for the solar inverter or included in the User Manual must be observed. Non-observance of these can lead to damage to health or to the death of operating or maintenance personnel or to persons in the vicinity of the solar inverter.

2 Scope of Delivery

1

1 x solar inverter AXM2

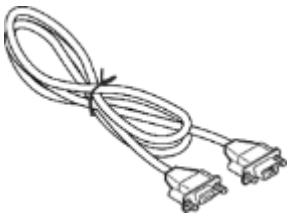


2

1 x UPS User Manual

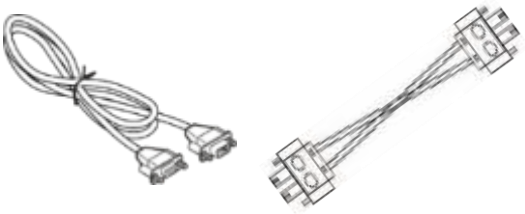
3

1 x communication cable for external display (SUB-D9 on RJ45)



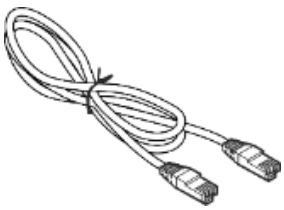
4

1 x parallel cable 1 x power compensation cable (only with AX-M2 5000-48 included in standard delivery)



5

1 x BMS communication cable for Pylontech lithium battery (connection to RS485-port)



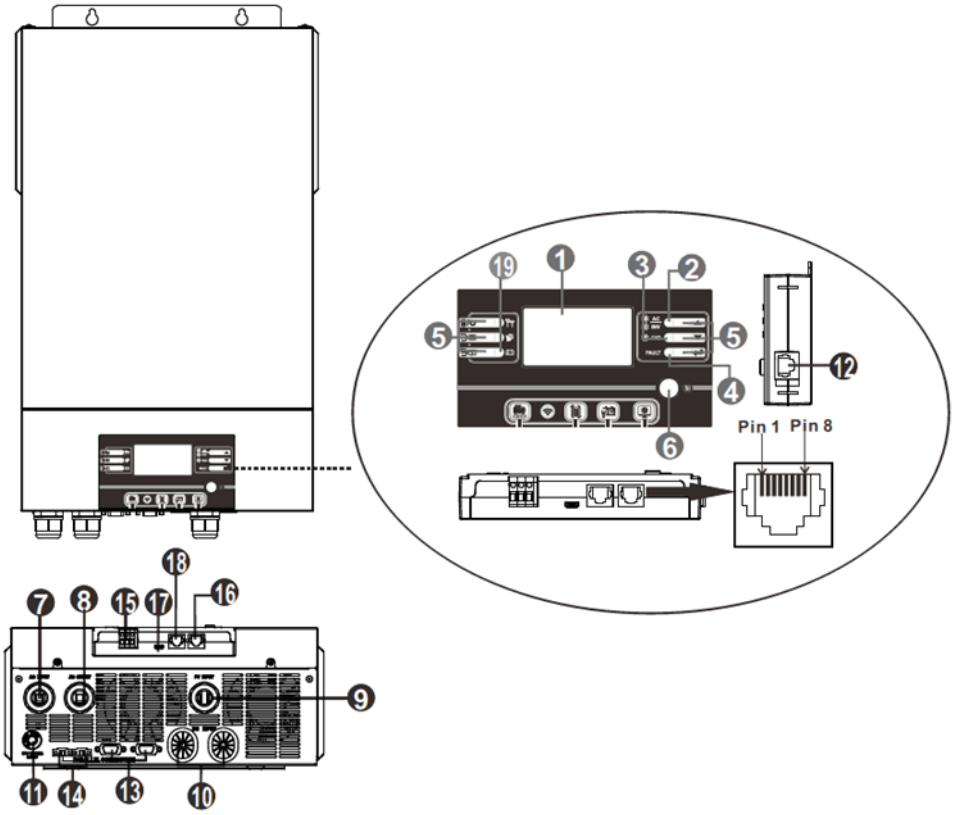
(dual -ided RJ45 plug)
Part-number: vo43-101203-02G

6

1 x software CD

3 Device Description

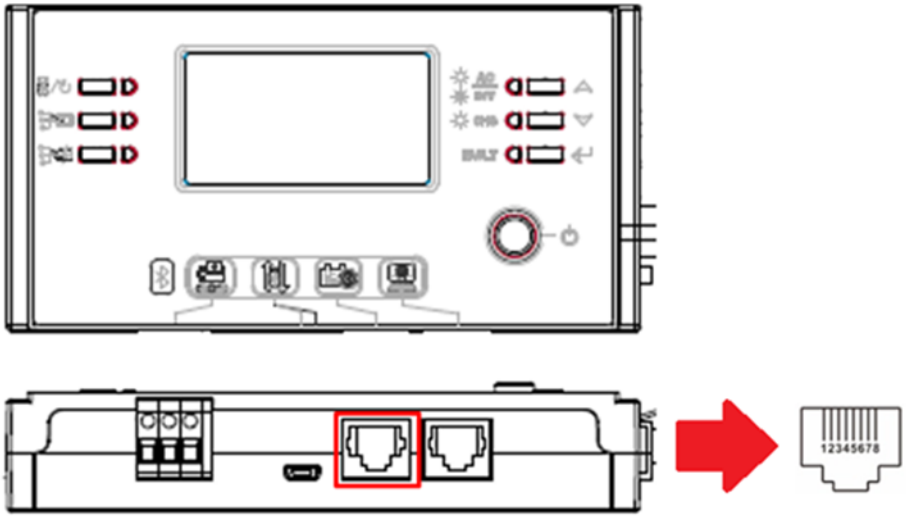
Figure 4: Device description



1	LCD display	2	LEDdisplay for status display
3	Charge display	4	Error display
5	Function buttons	6	On/Off switch
7	AC input	8	AC output
9	PV input	10	Battery input
11	Device fuse	12	Communication connection for the LCD remote control panel
13	Communication connection for parallel operation (optional)	14	Connections for power compensation in parallel operation
15	Potential-free contactbattery bank alarm, battery voltage too low.	16	RS-232communication port for external display or firmware update
17	USB connection	18	BMS-communication connection: CAN and RS232 or RS485
19	LEDdisplay for status display		

3.1 Pin assignment of the communication port

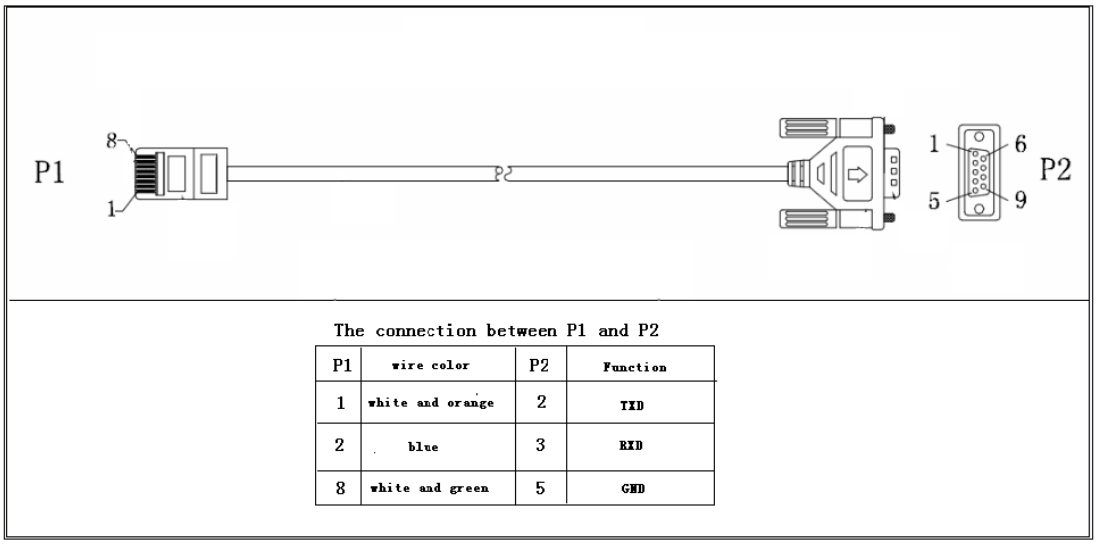
3.1.1 Definition BMS port



	Definition
PIN 3	RS485B
PIN 4	12V
PIN 5	RS485A
PIN 6	CANH
PIN 7	CANL
PIN 8	GND

3.1.2 Definition RS232 port

RJ45 to RS232 (cable between inverter and PC)

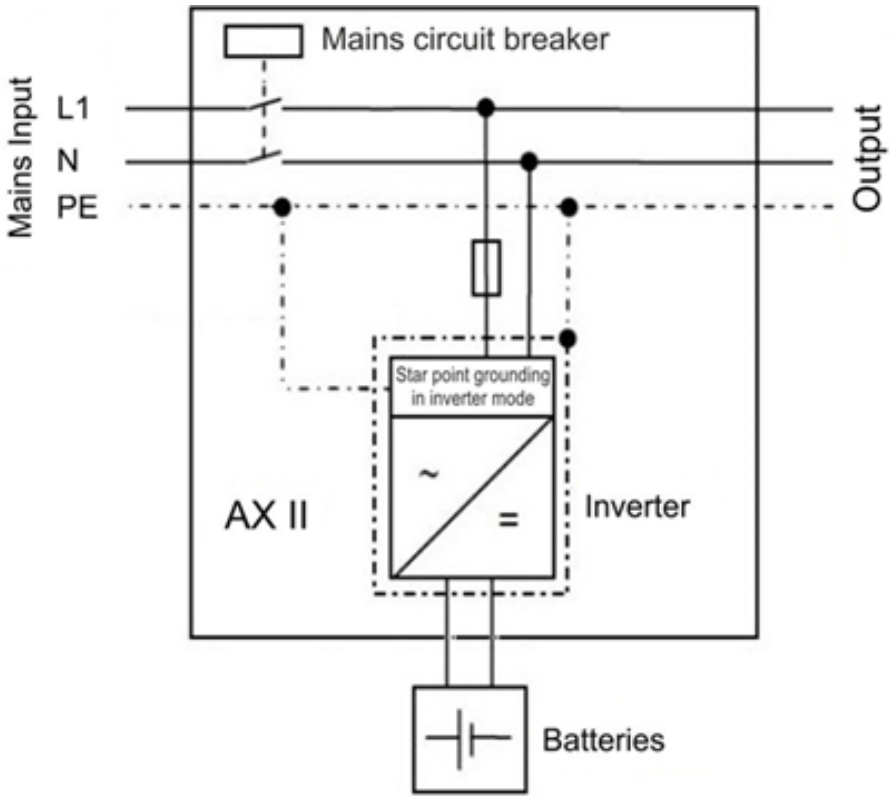


The connection between P1 and P2

P1	wire color	P2	Function
1	white and orange	2	TXD
2	blue	3	RXD
8	white and green	5	GND

4 Inverter mode and power forms

Solar inverters without a mains power supply are considered a load on the input side against the power supply and as a generator with respect to the load on the output side. It should be noted here that, in the output with the connection and structure of the mains power, all safety guidelines (protection for load and against accidental touch) are observed. The problem or a safety gap often occurs when the inverters interrupt the reference conductor (N or PEN) by switching to the mains mode of operation in the inverter mode. Through this, a TN-S load network in the inverter mode suddenly becomes an IT load network. Functionally, this status is not problematic, but, with respect to safety, it is not acceptable when the reference conductor is lost and the protection against accidental touch (e.g. RCD) is then ineffective.
Our AX series therefore realizes a neutral point simulation which also takes the guideline VDE AR-E 2510-2 into account. In this, the power supply is also decoupled by the circuit breaker when switching (mains mode -> to the inverter mode), but a neutral point simulation also occurs at the same time through the inverter. The protective conductor must always be connected for this purpose.



Star point grounding of the AX inverter series

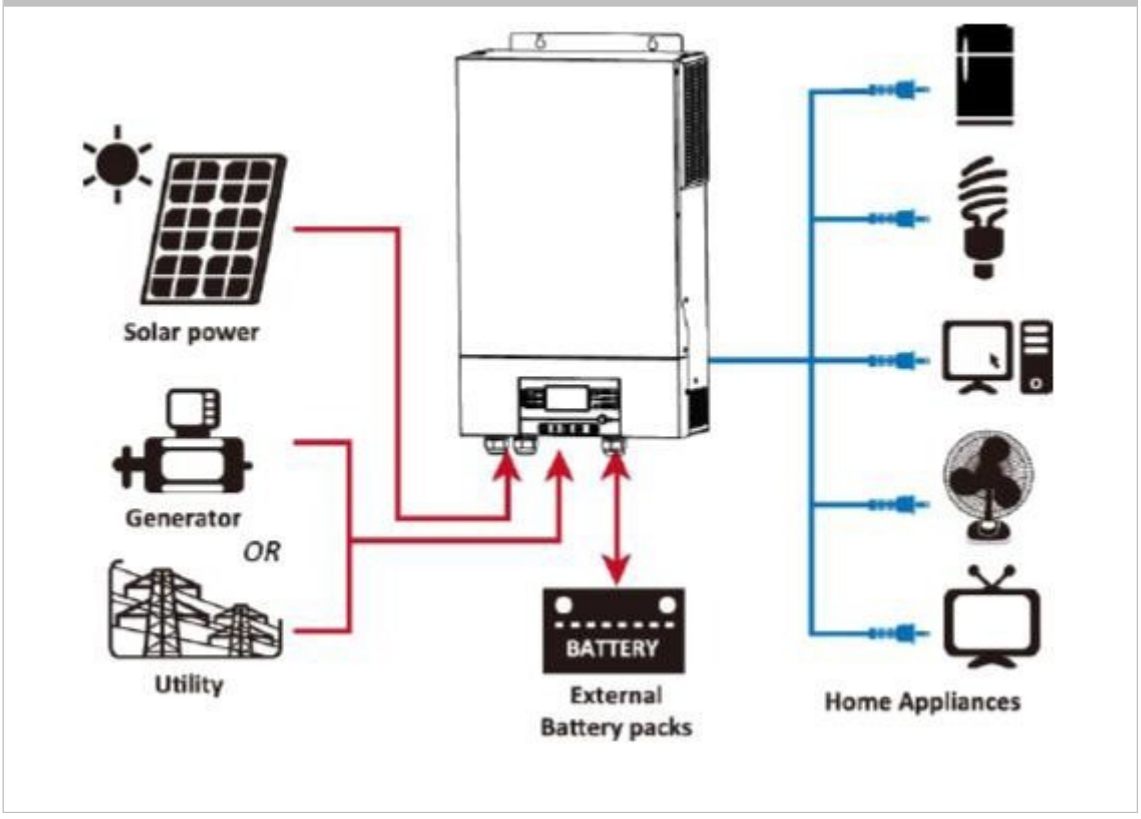
5. Function Description

This is a multi-function inverter/charging device that combines the function of an inverter, an MPPT solar charging device and a battery charging device to create an uninterrupted power supply.

An LCD display enables the simple operation of the most important functions, e.g. battery charging power, AC/solar charging priority and acceptable input voltage based on different applications.

The following figure shows a configuration example. Turn to your systems integrator to realize additional system architectures, depending on your requirements.

Figure 4: Function description



Possible power sources

Mains power supply, different generators, solar cells and accumulators.

Possible loads

Television, lamps, ventilators, refrigerators and air conditioning units and much more.

5.1 Additional features

- Pure sine inverter
- Integral MPPT solar charge controller
- Configurable input voltage range for household appliances and PCs via LCD setting
- Configurable battery charge power based on applications via LCD setting
- Configurable AC/solar charge priority via LCD setting
- Compatible with mains power supply or emergency generators
- Automatic restart while AC normalizes itself
- Overload/overtemperature/short-circuit protection
- Intelligent battery charge device for optimized battery performance
- Cold start function
- No switching time

5.2 Battery charge valance function (equalization)

The charge balance function, or equalization, is directly integrated in the charge controller. It reverses the development of negative chemical effects, such as layer formation, a condition in which the acid concentration on the bottom of the battery is greater than on the top surface. Additionally, the function also helps to remove sulphate crystals that could have developed on the panels of the battery.

For this reason, switching on the charge equalization is recommended to increase the lifespan of the battery bank and the capacity.

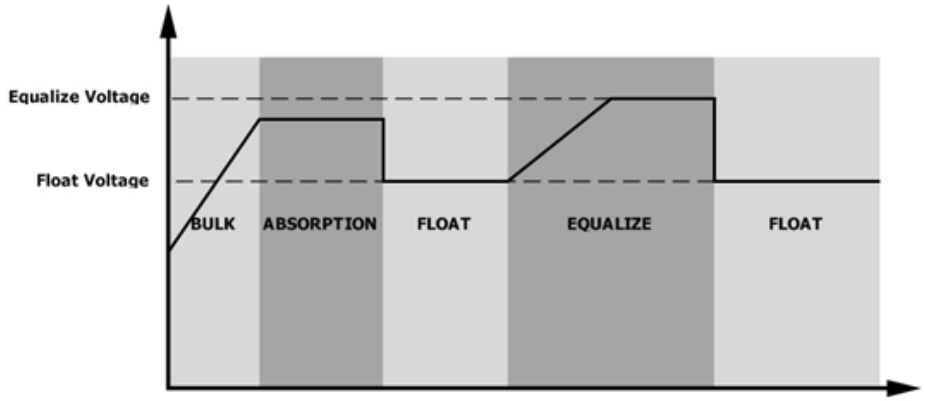
To activate the charge balance function, please set the parameters under menu point 33 to "ENABLE"  .Then define the interval time under menu point 37.

However, in order to make the above-mentioned menu points (33, 37) accessible, you must first select the parameter "USE" under menu point 05.

Fundamentally, the charge controller behaves according to the IUoU process. If the charge equalization is switched on via the menu, a charge equalization

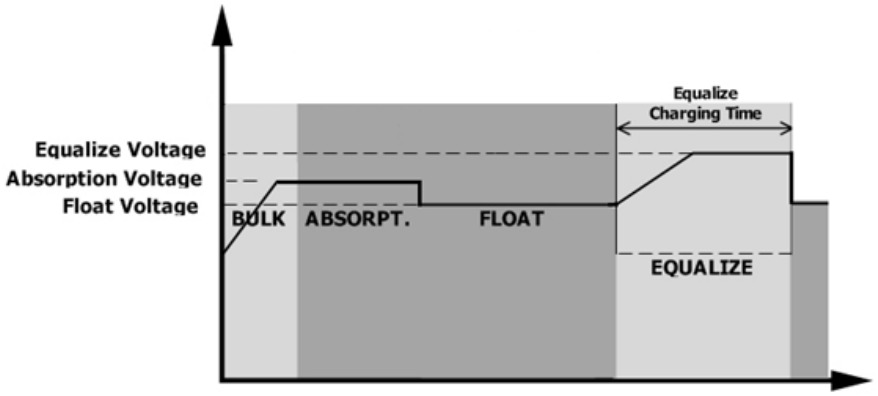
cycle is also performed (U3).

Figure 5: Function description – Battery bank charge equalization



The equalization time can also be set here via menu point 35.

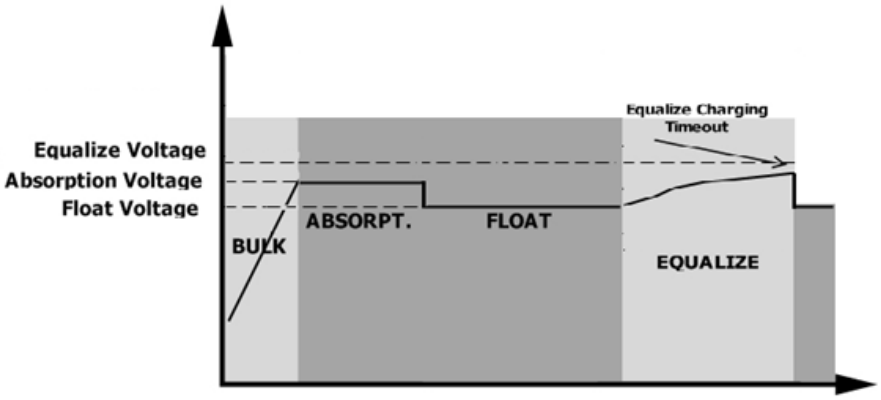
Figure 6: Function description – Battery bank charge equalization



If the defined equalization time does not reach the voltage threshold U3, the inverter communicates "TIMEOUT" and the charge equalization is deactivated.

6

Figure 7: Function description – Battery bank charge equalization



5.3 Use instructions for deep discharged batteries

We would like to call your attention to an operational situation which can lead to a deep discharge of the batteries in unfavorable circumstances. In the operation mode, "priority of the charge source" under "only PV charge operation" (menu point 16), the following situation can occur.

The load output switches from inverter operation to the bypass mode after the defined threshold falls short, but the batteries will continue to discharge through the internal consumption of the inverter. To ensure that the batteries will not totally discharge in this operation mode, a battery charging automatically starts via the mains power supply (although only PV charging operation is selected) when the battery voltage falls below 10V per battery block.

In the following situation, the automatic battery charging is not performed and can lead to a complete discharge of the batteries:

When there is no mains voltage or when a phase is missing from the 3-phase system (the voltages must be within the range of 170V – 280V AC). Without supply voltage, the mains charging device cannot carry out the charging.

When the PV voltage is present but the modules do not emit a PV output (e.g. very cloudly weather, snowy, etc.)

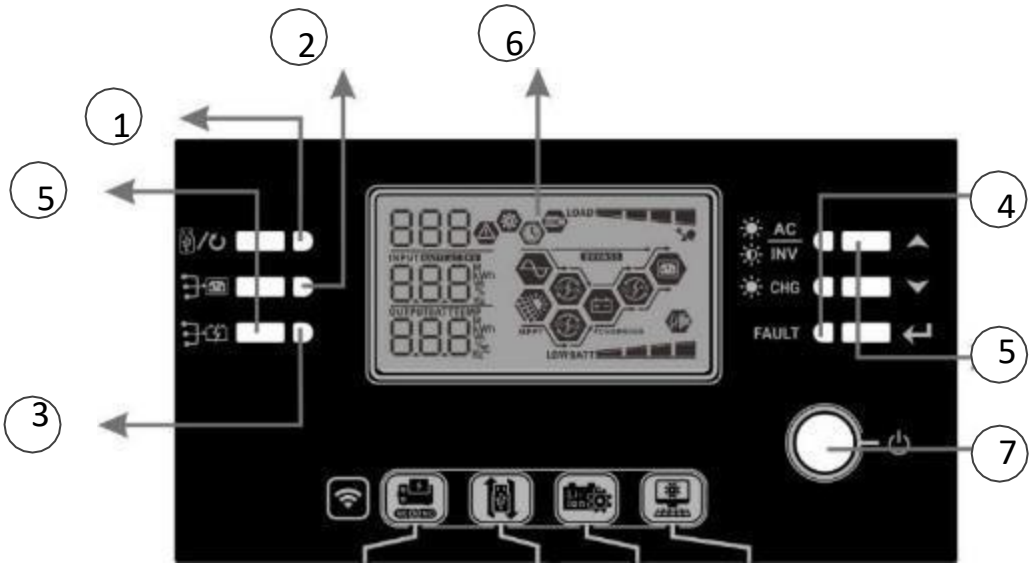
With the presence of the voltage from the PV modules, the inverter awaits a battery charge from the PV module, thus it does not begin the automatic battery charge.

Because the PV module is not emitting any output, the batteries will continue to discharge through internal consumption during this period.

We recommend completely shutting down the AX inverter during periods in which no PV outputs are expected (switch off AC input fuse, switch off PV input and remove the battery fuse), at least the PV modules should be switched off. Please note that the batteries are completely charged before a long period of being shut down.

6. Control and Display Elements

Figure 8: Control and display elements

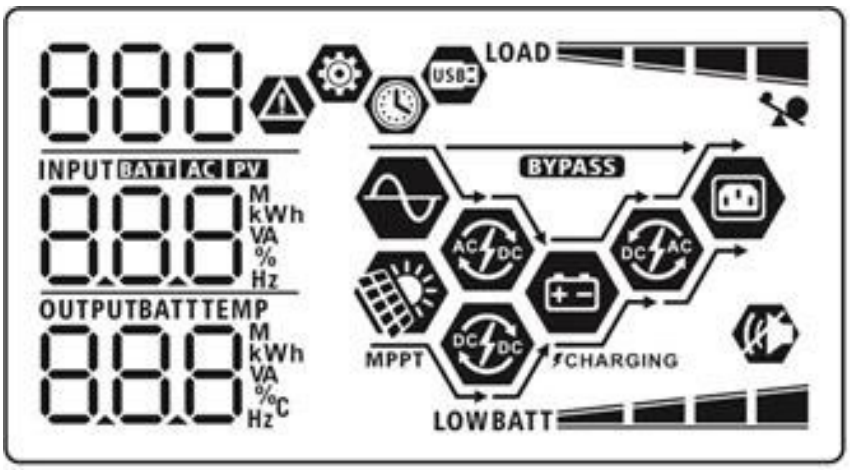


1	Setting LED1	Green	lighted	Output supplied by mains
2	Setting LED2	Green	lighted	Output supplied by PV
3	Setting LED3	Green	lighted	Output supplied by battery
4	AC / INV	Green	lighted	Output is available in the bypass mode
			blinking	The output is supplied by the battery or by AC in inverter mode
	CHG	Green	lighted	Battery is fully loaded
			blinking	Battery is charging.
	FAULT	Green	lighted	Error mode
			blinking	Warning mode
5	/↻	ESC		Exit the setting mode
		USB		Select the USB OTG functions
	▲	Up		For previous selection
	▼	Down		For next selection
	↵	Enter		To confirm the selection in the setting mode or call up the setting mode

6	Display (see 5.2Meaning of the display symbols)
7	On/Off switch

6.1 Description of the display symbols

Figure 9: Control and display elements



Input information	
AC	Displays the AC input.
PV	Displays the PV input.
	Displays the input voltage, input frequency, PV voltage, charging current, charging capacity, battery voltage.

Configuration program and error information	
	Displays the setting program.
	Displays the warning and error codes. Warning:  blinks with the warning code. Error: lighted with the error code

Output information	
	Displays the battery charge status with 0-24%, 25-49%,50-74%and75-100%in the battery mode and the charging status in the mains mode.

In the AC mode, it displays the battery charging status.

Status	Battery voltage	LC display
I-phase during the battery charging	<2V/cell	4bars blink alternatingly.
	2~2.83V/cell	The lower bar is lighted and the other three bars blink alternatingly.
	2.083~2.167V/cell	Both lower bars are lighted and the other two bars blink alternately.
	>2.167V/cell	The three lower bars are lighted and the upper bar blinks.
Charge retention mode. Batteries are fully charged.		4xbars are lighted.

Charging information	
	Displays an overload.
 	Displays the utilization rate with 0–24%,25–49%,50– 74% and 75–100%.  0%~24%  25%~49%  50%~74%  75%~100%

In the battery mode, the battery capacity is displayed.

Load in %	Battery voltage	LCDdisplay
>50%	<1.85V/cell	
	1.85V/cell~ 1.933V/cell	
	1.933V/cell~ 2.017V/cell	

	>2.017V/cell	
<50%	<1.892V/cell	
	1.892V/cell~ 1.975V/cell	
	1.975V/cell~ 2.058V/cell	
	>2.058V/cell	

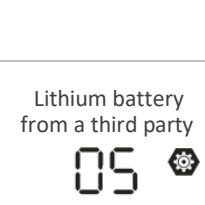
For better comprehension, the contents of the LCD display are listed in detail as follows:

Symbol / Field:	Function/ Content:
-Operation information-	
	The solar inverter is connected to the PV module.
	The solar inverter is connected to the mains power supply.
	Consumers (loads) are supplied by the mains power supply.
	Mains charging mode: the battery bank is charged by the mains power supply.
	PV charging mode: the battery bank is charged by the PV panels.
	Inverter mode: the loads are supplied by the inverter.
	The device alarm is switched off.
	Displays that a USB device is connected.
	Displays timer setting or the time indication

6.2 Program overview

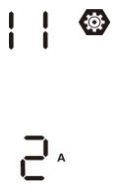
Program number	Description	Options	
00	Leaving the setting mode		
01	Priority, source of the load supply	USB: Utility first (preset) 	The inverter predominantly supplies the loads with power. If mains power is not available, solar power and batteries predominantly supply the loads with power.
		SUB: Solar first 	Solar energy predominantly supplies the loads with power. If the solar energy is not sufficient to supply all connected loads, the mains power supply provides the loads with power at the same time. The battery only supplies the loads with power when solar energy and and mains power are not sufficient.
		SBU priority 	Solar energy predominantly supplies the loads with power. If the solar energy is not sufficient to supply all connected loads, the battery power supplies

			the loads with power at the same time. The mains power supply only supplies the loads with power if the battery voltage either drops to the low warning voltage or the setting point in program 12 or solar and battery power are not sufficient.
02	Total charging power for solar and mains charging devices. (Total charging power = mains charging power + PV solar charging power)	60A(preset) 	The setting range of the 3KWmodel extends from 10Ato 120A. Setting in 10Asteps. The setting range of the 5-kWmodel extends from 10Ato 140A. Setting in 10Asteps.
05	Selection of the accumulator types	AbsorbentGlassMat(AGM) (preset) 	Lead acid battery (FLD) 
			When "user defined" is selected, the battery charging voltage and the low DC cut-off voltage can be inserted in the programs 26, 27 and 29.
		Pylontech (Manufacturer's name) 	When selected, the programs 02, 26, 27 and 29 are automatically arranged. No additional settings are necessary.

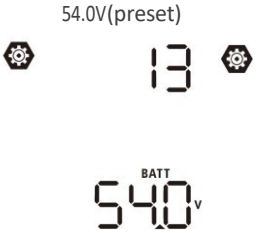
		48VWECO (Manufacturer's name)  	When selected, the programs 02,12,26,27 and 29are automatically configured based on the recommendation from the battery supplier.No further adaption necessary.
		48VSoltato (Manufacturer's name)  	When selected, the programs 02,26,27and 29are automatically arranged. No additional settings are necessary.
		Llb-protocol compatible  	Select "Llb" when using a battery compatible with the Libprotocol. When selected, the programs 02,26,27and 29are automatically arranged. No additional settings are necessary.
		Lithium battery from a third party  	When selected, the programs 02,26,27and 29are automatically arranged. No additional settings are necessary. Please contact the battery supplier regarding the installation procedure.
06	Automatic restart after overload	Deactivate restart (preset)  	Activate restart 

07	Automatic restart with overheating	Deactivate restart (preset) 	Activate restart 
09	Set the output frequency	50Hz(preset) 	60Hz 
10	Operating logic	Automatic (preset) 	When selected and utility is availably, the inverter operates in line mode. If the mains frequency is instable , the inverter operates in bypass mode when the bypass function in program 23 is not prohibited.
		Online mode 	When selected, the inverter operates in mains mode if mains power is available.
		ECO mode 	When bypass in program 23 is selected and bypass is not prohibited, the inverter operates in ECO mode if mains power is available.

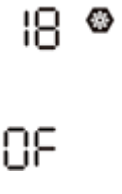
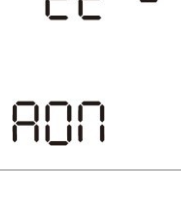
<table>
<tr><td rowspan="4">11</td><td rowspan="4">Max. mains charging current:

Note: If a smaller value is entered in menu point 02, the value from 02 is used for the mains charging current.</td><td>2A
  </td><td>10A
  </td></tr>
<tr><td>20A
  </td><td>30A(preset)
  </td></tr>
<tr><td>40A
  </td><td>50A
  </td></tr>
<tr><td colspan="2">60A
  </td></tr>
<tr><td rowspan="2">12</td><td rowspan="2">Battery bank voltage threshold:
Return from PV mode or inverter mode in mains mode if the priority in menu point 01 is set to SOL or SbU.</td><td>3KW Pre-setting: 23.0V
  </td><td>5KW Pre-setting: 46.0V
  </td></tr>
<tr><td colspan="2">The setting range of the 3-kW model extends from 22.0 V to 28.5 V, and the increment of each click is 0.2 V.
The setting range of the 5-kW model extends from 44.0 V to 57.0 V, and the increment of each click is 0.2 V.</td></tr>
</table>

<table>
<tr><td rowspan="5">13</td><td rowspan="5">Battery bank voltage threshold:

Return to inverter mode (autonomous) if the priority in menu point 01 is set to SOL or SbU.</td><td colspan="2">3-kW model:The setting range extends from 24.0 V to 29.2 V, and the increment of each click is 0.2V.</td></tr>
<tr><td>Battery fully charged
  </td><td>27.0V(preset)
  </td></tr>
<tr><td colspan="2">5-kW model: The setting range extends from 48.0 V to 58.4 V, and the increment of each click is 0.2V.</td></tr>
<tr><td>Battery fully charged
  </td><td>54.0V(preset)
  </td></tr>
</table>

16	Priority of the charging source:	SbL:Solar energy first for battery UCb:Charging of the battery with the mains supply permitted 	PV charging mode (priority): only if solar energy is not available is the mains charging mode is activated.
		SbL:Solar energy first for battery UdC:Charging of the battery with the mains supply permitted 	Only PV charging mode (priority). No mains charging mode permitted.
		SLb:Solar energy first for the load UCb:Charging of the battery with the mains supply permitted 	PV energy supplies the load first, and the mains charging mode is permitted.
		SLb:Solar energy first for the load UdC:Charging of the battery with the mains supply permitted 	PV energy supplies the load first. No mains charging mode is permitted.

18	Alarm management 	Alarm on (pre-set) 	Alarm off 
19	Display of operation information: Return to the pre- set menu page.	Return to the standard display screen (pre-set) 	When this option is selected, it is independent of how the user switches to the display screen, it automatically returns to the standard display screen (input voltage/output voltage)after no buttons have been pressed for 1 minute.
		Remain on current menu 	When selected, the display screen remains until it has received the last screen change from the user.
20	Background lighting	Background lighting on (pre-set) 	Background lighting off 
22	Acoustic signal if the primary source is interrupted	Beep on (pre-set) 	Beep off 

<table>
<tr><td rowspan="3">23</td><td rowspan="3">Bypass mode in case of overload:
In the case of overload in inverter mode, the device switches to bypass</td><td>Bypass function (not permissible)
  </td><td>When selected, the inverter does not function in the bypass/ECO mode.</td></tr>
<tr><td>Bypass function off
  </td><td>When selected and the ON button has been pressed, the inverter can only operate in the bypass/ECO mode if mains power is available.</td></tr>
<tr><td>Bypass function on
  </td><td>When this option is selected and, independent of whether the ON button has been pressed or not, the inverter operates in the bypass mode if mains power is available.</td></tr>
<tr><td>25</td><td>Storing the errors:
(FAULTCODES)</td><td>Display error code – on
  </td><td>Display error code – off
  </td></tr>
<tr><td rowspan="2">26</td><td rowspan="2">Defining battery bank, bulk charging voltage:</td><td>3KW Pre-setting: 28.2V
  </td><td>5KW Pre-setting: 56.4V
  </td></tr>
<tr><td colspan="2">When menue point 05 "USE" is selecte
bulk charging voltage can be set here.
The setting range extends from 24.0 V to 32.0 V for the 3-kW model and from 48.0 V to 64.0 V for the 5-kW model. The increase per each click is 0.1 V.</td></tr>
</table>

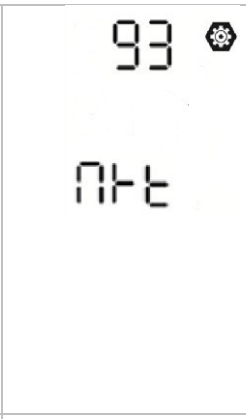
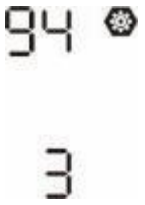
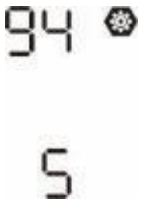
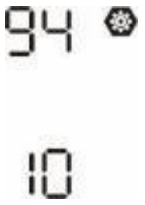
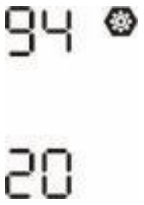
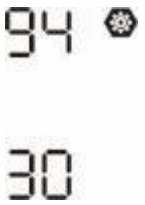
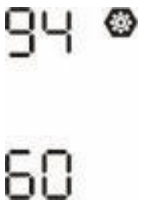
<table>
<tr><td>27</td><td>Defining battery bank, charge retention voltage:</td><td>3KW Pre-setting: 27.0V
 
</td><td>5KW Pre-setting: 54.0V
 
</td></tr>
<tr><td></td><td></td><td colspan="2">When "USE" is selected in menu point 05, the charge retention voltage can be set here.
The setting range extends from 24.0 V to 32.0 V for the 3-kW model and from 48.0 V to 64.0 V for the 5-kW model. The increase per each click is 0.1V.</td></tr>
<tr><td rowspan="4">28</td><td rowspan="4">Setting the output operation mode.
(This parameter setting is only available in STAND-BY MODE for safety reasons).
It is recommended to use a maximum of 4 SWRs in parallel mode and 3SWRs in three-phase current operation.</td><td>Single
 
</td><td>If the device is operated alone, please select "SIG" in program 28.</td></tr>
<tr><td>Parallel
 
</td><td>When units are used in parallel for single phase applications, please select "PAL" in program
28. Please refer to 5-1 for detailed information.</td></tr>
<tr><td>L1Phase
 

L2Phase
 
</td><td rowspan="2">When the units are operated in a 3-phase application, please select "3PX" to define each inverter.
At least 3 inverters or a maximum of 9 inverters are required to support three-phase devices. At least one inverter in each phase or up to four inverters in one phase are</td></tr>
<tr><td>L3Phase</td></tr>
</table>

			required. Please refer to 5-2 for detailed information. Please select "3P1" in program 28 for the inverter connected to phase L1, "3P2" in program 28 for the inverter connected to phase L2 and "3P3" in program 28 for the inverter connected to phase L3. Ensure that you connect a common power cable to the units located in the same phase. DO NOT connect a common power cable between devices on different phases.
29	Defining battery bank, cut-off voltage: When "USE" in menu point 05 is selected, the cut-off voltage can be set here.	3KW Pre-setting: 27.0V 	5KW Pre-setting: 54.0V 
32	Charging conduct or duration of the bulk charge.	Charging time automatic (pre-set) 	Minutes 

	Charging conduct or duration of the bulk charge.	When "user defined" is selected in program 05, this program can be set. The setting range extends from 5 min to 900 min. The increment of each click is 5 minutes. Otherwise, maintain the automatic charging time.	
33	Charge balance of the battery bank (equalizing) (only available when "USE" is selected under 05).	Activate battery equalizatio 	n Deactivate battery equalizzation (pre-set) 
34	Battery bank voltage during charge equalization.	3KW Pre-setting: 29.2V 	5KW Pre-setting: 58.4V 
		The setting range extends from 24.0 V to 32.0 V for the 3-kW- model and from 48.0 V to 64.0 V for the 5-kW model. The increment of each click is 0.1 V.	
35	Charge equalization duration for the battery bank.	60min (pre-set) 	The setting range extends from 5 min to 900 min. The increment of each click is 5 minutes.
36	Charge equalization TIMEOUT of the battery bank.	120min (pre-set)	The setting range extends from 5 min to 900 min. The increment of each click is 5 min.

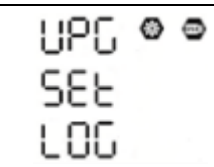
		36  120	
37	Charge equalization interval of the battery bank.	30 days (pre-set) 37  30d	The setting range lies between 0 and 90 days. The increment of each click is 1 day
39	Charge equalization of the battery bank is immediately started.	Deactivate (pre-set) 39  AdS	Activate 39  AEn
		When the equalizing function in program 33 is activated, this program can be configured. When "activate" is selected in this program, the battery equalization is activated immediately and displayed on the LCD main page E9. Whenn "deactivate" is selected, the equalizing function is terminated until the next activated equalization time based on the setting of program 37 occurs. At this point in time, E9 is not shown in the LCD main page.	
40	All stored data for PV production capacity and reset output load energy	No reset (pre-set) 40  nrt	Reset 40  rSt
93	Delete all data protocols	Delete all data protocols	Reset

			
94	Log interval of the data protocol *The maximum data protocol number is 1440. If it lies over 1440, the first protocol is rewritten.	3 minutes 	3 minutes 
		10 minutes (pre-set) 	20 minutes 
		30 minutes (pre-set) 	60 minutes 
95	Time setting – minutes		For the minute setting, the range extends from 00 to 59.
96	Time setting – hours		For the hour setting, the range extends from 00 to 23.

97	Time setting – Day		For the day setting, the range is from 00 to 31.
98	Time setting – Month		For the month setting, the range is from 01 to 12.
99	Time setting – Year		For the year setting, the range is from 17 to 99.

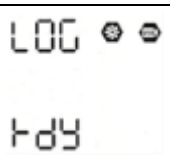
6.3 Setting of the USB function

Plug the USB data medium in the USB port ( ).Press the button "/" for 3 seconds to call up the USB function setting. These functions comprise the updating of the inverter firmware, the export of data protocol and the rewriting of internal parameters of the USB disk.

Procedure on LCD screen	LCD screen
Step 1:Press " /↻ " button for 3 seconds to call up the USB function setting mode.	
Step 2: Press the button /↻ "," " or " "to call up the setting program to select.	

Step 3 :Please select the desired program from the following.

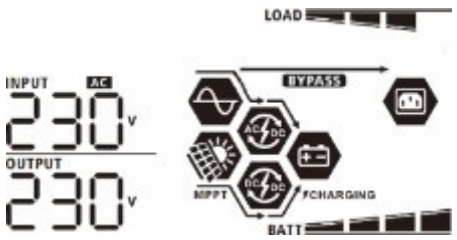
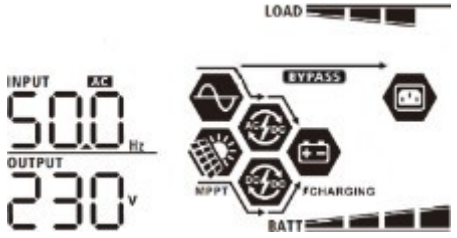
Program#	Operation principle	LCD screen
/↻ Firmware upgrade	This function serves to update the inverter firmware. If a firmware update is required, please contact your supplier or installer to get detailed instructions.	
 Reset internal parameters	With this function, all parameter settings (TEXTfile)are overwritten with the settings on the on-the-go USB disk from a previous set up or the inverter settings are duplicated. Please contact your supplier or installation personnel for detailed instructions.	

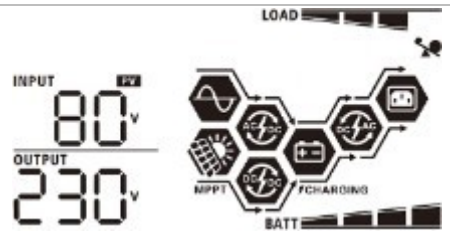
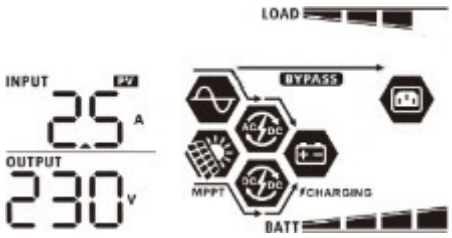
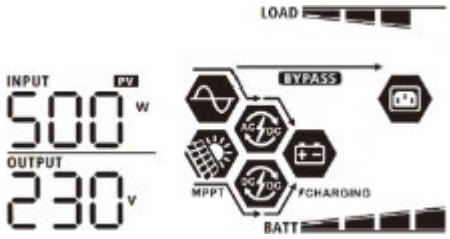
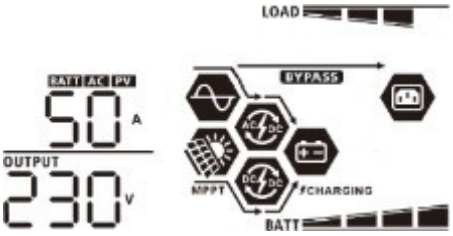
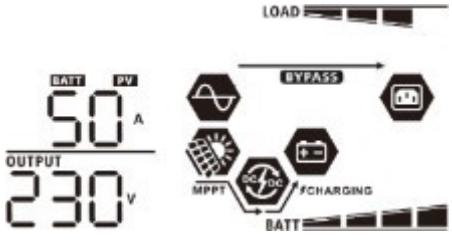
Export data protocol	Press the button " " to export the data protocol of the inverter to the USB disk. When the selected function is ready, the following is displayed on the LCD " ". Press the Button to confirm the selection again.	
	● Press the button " " to select "yes." The LED 1 blinks once per second during the process. On the display, only is displayed and all LEDs light up after the process is completed. The press the button " " to return to the main screen or press the button to select "no" and return to the main screen.	

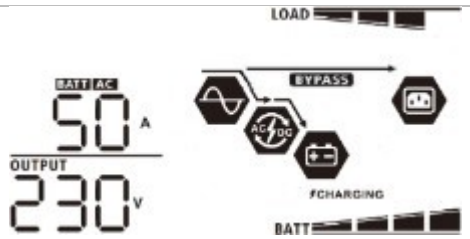
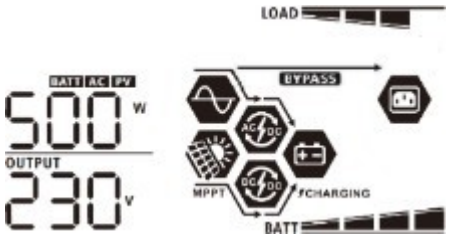
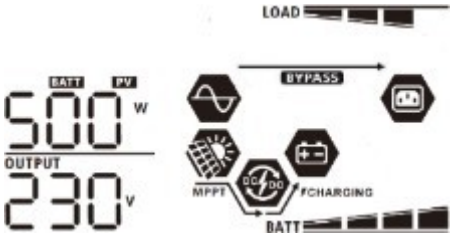
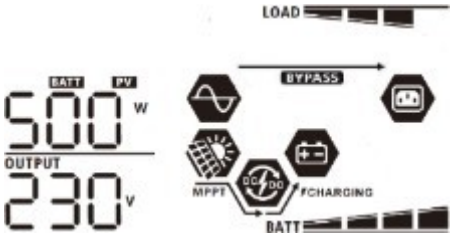
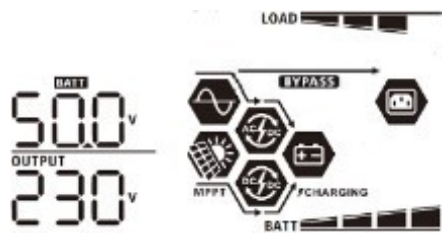
When a button has not been pressed for 1 minute, the device automatically returns to the main screen.

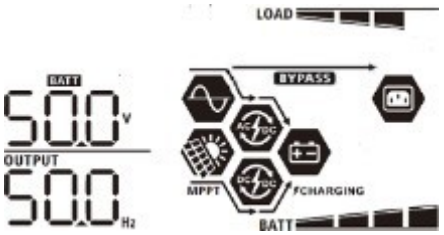
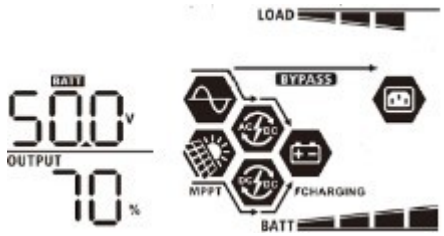
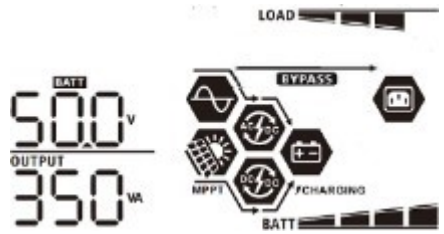
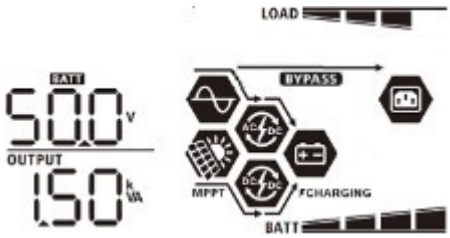
6.4 LCD display information

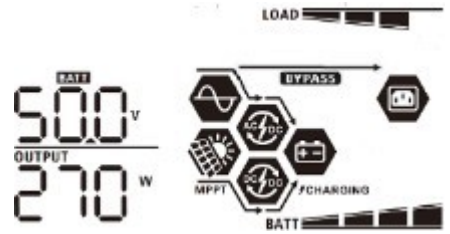
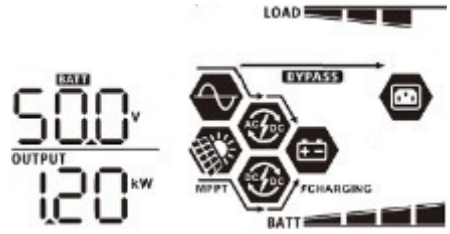
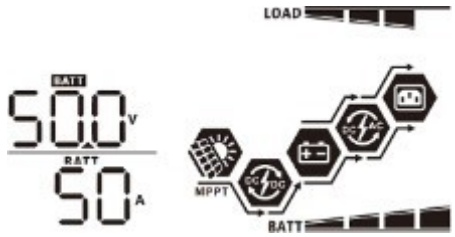
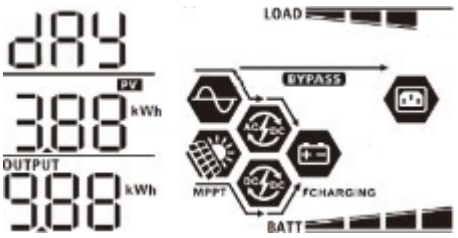
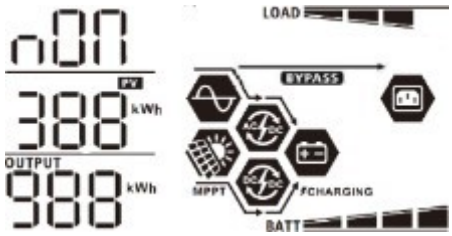
The LCD display information can be switched by pressing the "UP" or "DOWN" button. The information is displayed according to the following order:

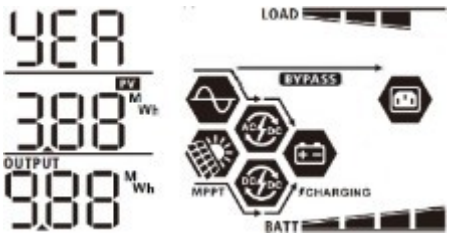
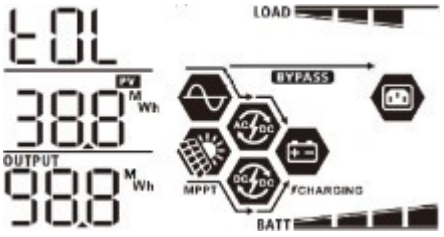
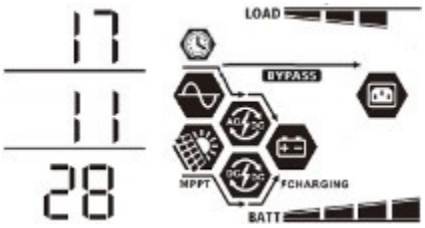
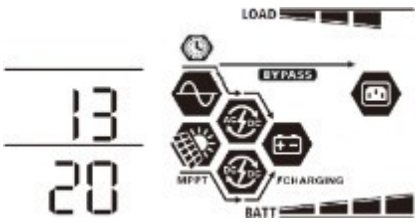
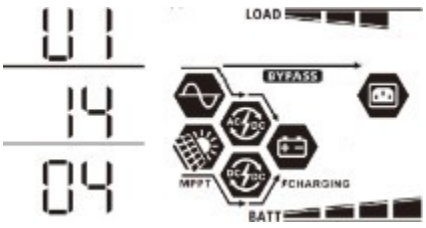
Meaning	Display information
Input voltage/output voltage	Input voltage =230V,Output voltage =230V 
Input frequency	Input frequency =50Hz 
PVvoltage	PV voltage =80V

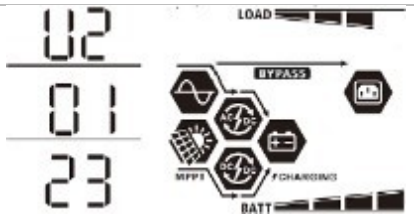
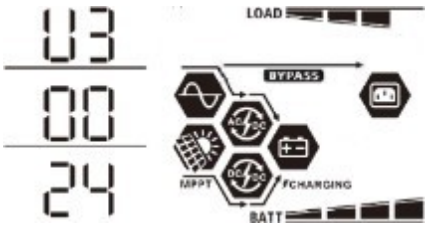
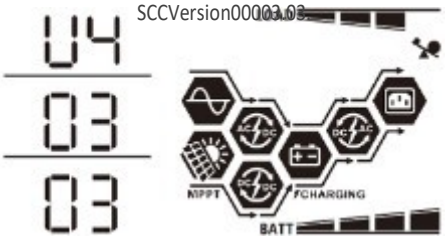
	
PV current	PV current =2.5A 
PV capacity	PV capacity =500W 
Charging current	AC and PV charging current =50A  PV charging current =50A  AC charging current =50A

	
Charging capacity	AC and PV charging capacity =500W  PV charging capacity =500W  AC charging capacity =500W 
Battery voltage and output voltage	Battery voltage =50.0V,Output voltage =230V 

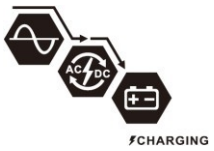
Output frequency	Output frequency =50Hz 
Charging on a percentage basis	Charging percent =70% 
Load in VA	When the connected load is lower than 1kVA, the load shows in VAxxxVA  When the load is greater than 1kVA(≧ 1kVA), the load shows in VAx,xkVA 

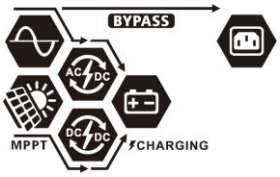
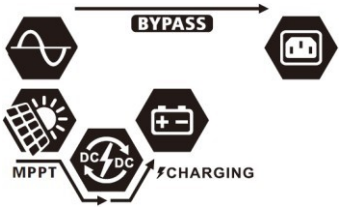
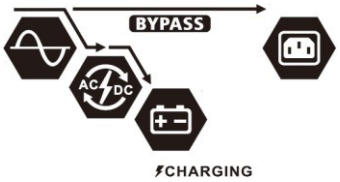
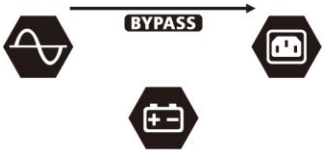
Load in watts	When the load is lower than 1kW, the load shows in WxxxW.  When the load is greater than 1kW(≧ 1kW), the load shows in Wx,xkW. 
Battery voltage/DC discharge current	Battery voltage =50.0V,Discharge current =50A 
PV energy generated today and load energy emitted today	PV energy generated today =3.88 kWh, Load output energy today =9.88 kWh. 
PV energy generated this month and load energy emitted this month.	This month's PV energy =388kWh, Monthly load energy =988kWh. 

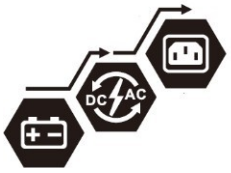
PV energy generated this year and load energy emitted this year.	This year's PV energy =3.88MWh, Annual load energy =9.88MWh. 
Total PV energy emitted and total energy of load output.	Total PV energy =38.8MWh,Load output total energy =98.8MWh. 
Real date.	Real date 28 November 2017. 
Real time	Real time 1:20 pm. 
Review of main CPU version.	Main CPU version 00014.04. 
Review of secondary CPU version.	Secondary CPU version 00001.23.

	
Wi-Fi version test	WLANVersion00000.24. 
Review of the SCC version	SCCVersion00003.03 

6.5 Description of the operation modes

Operation mode	Description	Display
Standby mode The inverter has not yet been switched on. At this time, the inverter can charge the battery without AC output.	The device has no capacity, but the batteries can still be charged.	Charging via mains and PV energy. 
		Charging via mains energy. 
		Charging via PV energy.

		
		Not charging. 
Error mode Errors can be caused by internal circuiting error or by overtemperature and a short circuit on the output.	Bypass operation	Charging via mains and PV energy. 
		Charging via PV 
Bypass/ECO mode	Power of the device The batteries are charged via PV or mains energy.	Charging via mains energy 
		Not charging 
Line mode	The device supplies power from the mains. The battery is also charged in line mode.	Charging via mains and PV energy.

		
		Charging via mains energy. 
Battery mode	The device supplies power from the battery and PV system.	Power from battery and PV energy. 
		PV energy supplies the loads with power and charges the battery at the same time. 
		Power supply only via the battery. 

7 Storage, Transport and Unpacking

7.1 Storage

If the solar inverter is to be stored after delivery, the following points must be observed:

- Always leave the device and the accessories in the original packaging.
- The recommended room temperature should be within the range of 10 – 25 ° C. In each case, it should not exceed or drop below the maximum temperature limits.
- The delivery must also be protected against moisture. It should only be stored under dry conditions.
- If the storage period exceeds 4 months, the accumulators of the solar inverter must be charged for a period of ca. 24 hours to avoid a deep discharge of the accumulators and, by implication, irreversible damage to these.

7.2 Transport to installation site

The solar inverter is only permitted to be transported to the point of destination in its original packaging. The same applies to moves or return shipments.

The packaging does not have functional impact protection. As a result, all devices that fall or tip over before their initial operation must be inspected by EFFEKTA Regeltechnik GmbH. The same applies to damages to the devices.

In general, there is a high risk in the case of transport damages that the energy storage system and/or its electrical connections are also affected. This does not exclude short circuits and/or electrolyte leakage. This is why the unit must be isolated until inspection.

Because the delivery usually does not coincide with the installation site, the system must be transported there. In doing so, the following must be observed:

Always transport the original delivery as close as possible to the installation site. After unpacking and positioning the system, this should be moved to the final installation site by means of a lift truck or transport rolls;

Always transport the system to the predetermined transport position.

Also mind the indicated center of gravity when transporting.

These is always a general risk of tipping in units with a high center of gravity.

7.3 Unpacking and positioning

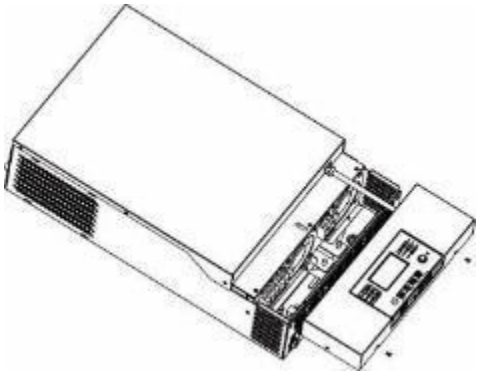
At the installation site, the packaging must be removed with the greatest care to avoid damages to the unit and the packaging material as much as possible.

The following order is to be observed here:

- Mind that, during the unpacking, there is sufficient room for activity.
- Open the metal tabs on the packaging walls and cover and carefully remove these.
- Also remove all padding and the accessories so that the unit stands alone on the palette.
- Lift the unit off the palette by means of a forklift or lift truck. It is important to observe here that the pick-up points are carefully chosen and are eventually subject to floor areas in order to not damage, for example, the side walls or other parts of the unit;
- Inspect the scope of the delivery for completeness.
- Inspect all packaging materials to ensure that no parts are missing.
- After unpacking, check the delivery for visible damages that could have occurred during transport. Under no circumstances should you activate the device if you have identified damages or if parts are missing. Instead, inform the supplier or distributor immediately .
- The packaging is recyclable. Please save it after unpacking for reuse or dispose of it properly.

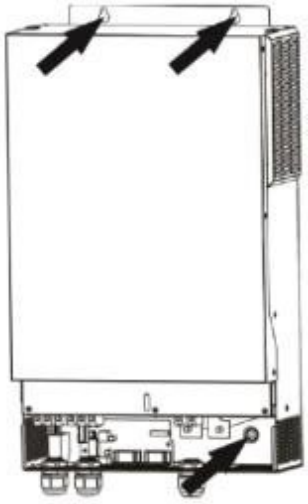
8 Installation Preparation

To be able to carry out the installation and connection tasks, the bottom of the device must be opened.

Step1	
	Remove both screws. Remove the bottom cover.

8.1 Assembly instructions

- Do not mount the inverter on flammable building material.
- Mount the device on a stable surface (e.g. concrete).
- Install this inverter at eye level to be able to read the LCD display at any time.
- The room temperature should be between 0°C and 55°C to ensure optimal operation.
- The recommended installation position to maintain is vertical to the wall.

Step 2	
	Install the device in such a manner that it is mounted to the wall at three points. M4 or M5 screws are recommended for use here.

9 Connection

9.1 Safety instructions

WARNING

Risk of injury!
To avoid electrical hazards, connection of the device should only occur in a de-energized state.
All the wiring must be carried out by qualified personnel. The 5-point rule should always be observed here:

- Enable the unit and connections;
- Secure all engaged sources and devices against unauthorized restarting;
- Check all connections for zero voltage;
- If necessary, ground or short circuit parts;
- Cover or shut off neighboring energized parts;

- Before using the device, read all the instructions and warnings pertaining to the device and batteries as well as all relevant sections of the User Manual.
- To reduce the risk of injury, only charge rechargeable lead-acid batteries. Other types of batteries can explode and cause injury and damage.
- Do not disassemble the device. Bring it to a qualified customer service center if maintenance or repairs are necessary. Incorrect assembly can led to risk of electrical shock or fire.
- Only qualified persons are permitted to install batteries in this device.
- NEVER charge a frozen battery.
- Fuses are intended as overcurrent protection for the battery supply.
- This inverter/charging device should be connected to a permanently grounded wiring system. It is important to observe the local requirements and regulations for the installation of this inverter.
- NEVER short circuit the AC output and the DC input. Do NOT connect the device to the power supply if the DC input has been shorted.

9.2 Connecting the battery

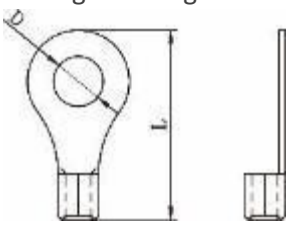
⚠ WARNING

Risk of injury!

- Do not place anything between the inverter terminal and the ring cable lug. Otherwise, this can lead to overheating.
- Do not apply an antioxident to the terminals before the terminals are securely connected.
- Before establishing the final DC connection or closing the DC power switch/ circuit breaker, ensure that plus (+) is connected to plus (+) and minus (-) is connected to minus (-).
- For safe operation and the observance of regulations, it is necessary, to install a separate DC overcurrent protection or an isolating device between the battery and the inverter. In many applications, an isolating device may not be necessary. Nevertheless, the installation of an overcurrent protection is still required. Please refer to the typical current in the following table for the required fuse size or the contact breaker size.
- All the wiring must be carried out by qualified personnel.

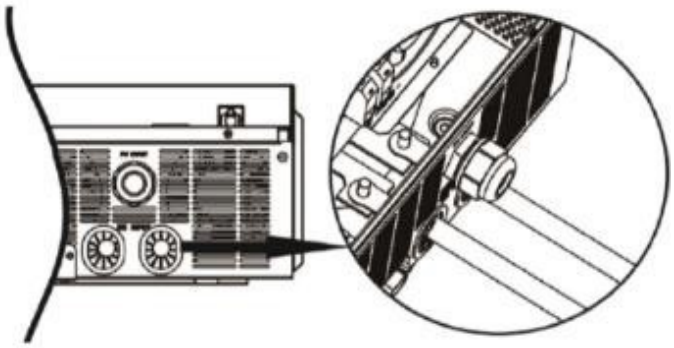
For system safety and efficient operation, it is very important to only use the recommended cable and connector sizes for the battery connection.

Ring cable lug:



Model	Typical current	Battery capacity	Cable size	Ringcable lug			Tighten-ing torque
				cable mm^2	Measurements		
					D(mm)	L(mm)	
3KW	200A	200Ah	1*70mm^2	70	6.4	49.7	2~3Nm
			2*25mm^2	25	6.4	49.7	
5KW	200A	200Ah	1*70mm^2	70	6.4	49.7	2~3Nm
			2*25mm^2	25	6.4	49.7	

Step1



Mount the battery cable lug in concordance with the recommended battery cable and terminal size.

Connect all battery packs as needed.

- *It is recommended to connect*

  a battery with a capacity of at least 200 Ah for the 3-kW model

- *and a battery with a capacity of at least 200 Ah for the 5-kW model.*

Insert the ring cable lug of the battery cable into the battery port of the inverter.

Ensure that the screws are tightened with a torque of 2-3Nm.

Ensure that both the battery and the inverter/charging device are accurately poled and that the ring cable pug is screwed tightly to the battery terminal.

9.3 Preparing an AC input/output connection

⚠ WARNING

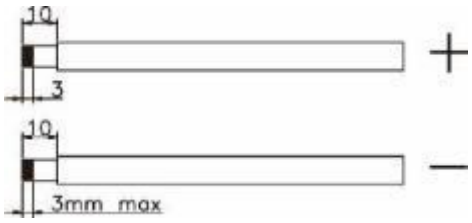
Risk of injury due to electricity!

- Install a separate AC isolating device between the inverter and the AC input power source. This ensures that the inverter can disconnect safely during maintenance and is fully protected against overcurrent from the AC input. The recommended specification of the AC isolating device is 30A for 3KW,50A for 5 KW.
- There are two terminal blocks, marked with "IN' and "OUT." Input and output connections can under no circumstances be connected improperly.
- For system safety and efficient operation, it is very important to use suitable cables for the AC input connection.

Recommended cable sizes:

Model	Cable diameter	Tightening torque
3KW	6mm²	1.2~1.6Nm
5KW	10mm²	1.4~1.6Nm

Step 1



Before preparing the AC input/output connection, ensure that the DC protection or isolating device is first open.

Keep a distance of ca. 10 mm from the isolation. Shorten the phase (L) and neutral line (N) by 3 mm.

9.4 Connecting a photovoltaic system

⚠WARNING

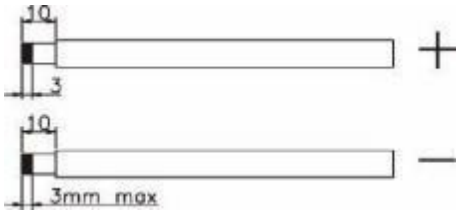
Risk of injury due to electricity!

- Install a separate DC isolating device between the inverter and the PV module.
- All the wiring must be carried out by qualified personnel.
- For system safety and efficient operation, it is very important that suitable cables are used for the connection of the PV module.
- Ensure that the inverter power source is disconnected before beginning with the wiring for the device.

Recommended cable sizes:

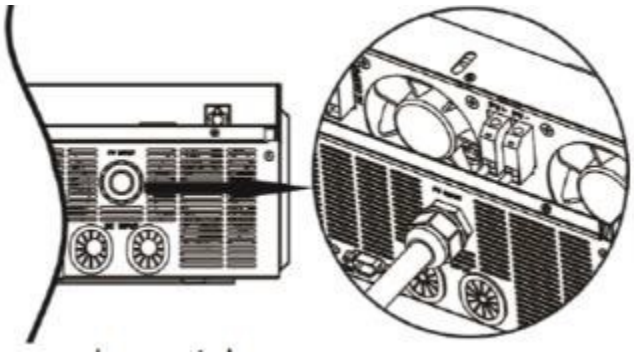
Model	Max. current	Cable diameter	Tightening torque
3KW	60A	6mm²	1.2~1.6Nm
5KW	80A	10mm²	

Step 1



Remove ca. 10 mm of the isolation from the plus and minus lines.

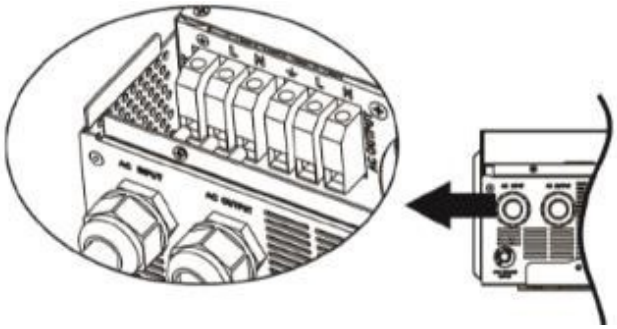
Step 2



Check the correct polarity of the connection cable from the PV module and PV input connector.

Connect the plus pole (+) of the connection cable to the plus pole (+) of the PV input connector. Connect the minus pole of the connection cable (-) to the minus pole (-) of the PV inputconnector.

Step 3



Insert the AC input cable according to the polarities indicated on the terminal block.

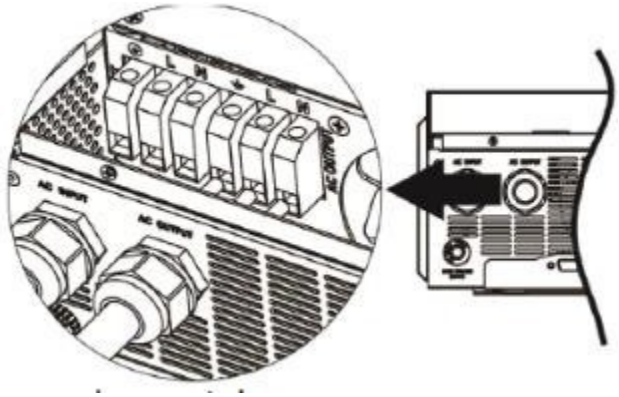
Tighten the terminal screws. Connect the PE conductor first.

PE:Mass (yellow-green) L:

LINE(brown or black)

N:Neutral(blue)

Step 4



Insert the AC output cable according to the polarities indicated on the terminal block and tighten the terminal screws. It is critical to connect the PE conductor first.

PE: Mass (yellow-green) L:

LINE (brown or black) N:

Neutral(blue)

Ensure that all connected cables are tightly secured.

CAUTION

Damage to devices without time delay function!

Air conditioners require at least 2-3 minutes to restart as sufficient time is required for offsetting the refrigerant gas in the cycle. If a power failure occurs and recovers after a brief period, this can lead to damages to your connected devices.

To prevent this type of damage, please check with the air conditioner manufacturer prior to installation if the device is equipped with a time delay function. Otherwise, this inverter/charging device triggers an overload fault and interrupts the output to protect your device, but this still sometimes causes internal damage to the air conditioner.

CAUTION

Damage to devices due to incorrectly connected polarity!

Make sure to connect the AC cable with the correct polarity. If the L and N cables are incorrectly connected, this can lead to a short circuit of the power supply if the inverter is operating in parallel.

CAUTION

Damage to the generator due to inappropriate generator power!

The recommended generator power should be at least twice the inverter power.

- Generator output: pure sine wave
- Effective value range of the output voltage of the generator: 180 ~ 270VAC
- Frequency range of the generator output: 45 Hz ~ 63 Hz

9.5 Several devices in parallel mode

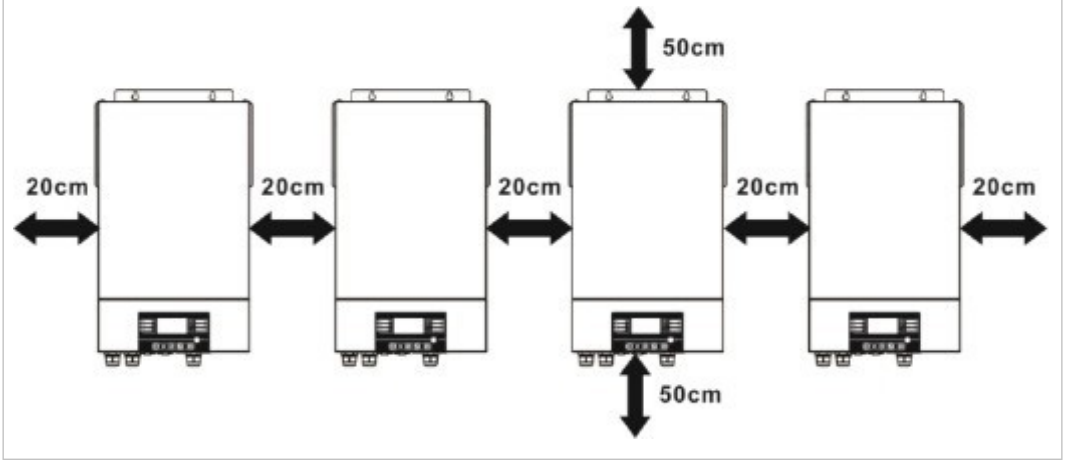
This inverter can be used in parallel for two applications.

- Parallel mode is one-phase with the possibility of up to 9 units. The maximum supported output power is 45KW/45KVA.
- A maximum of 9 devices can be operated parallel to each other in the three- phase system. Seven units can be maximumly connected in one phase. The maximum supported output power is 45 kW/45 kVA, a maximum of 35kW/kVA. in one phase.

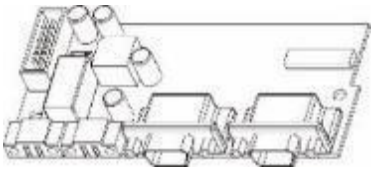
For parallel operation, you require the accessories package with the name Parallel Kit.

Leave clearance for good air circulation for heat dissipation of ca. 20 cm on the sides and ca. 50 cm above and below the device. Ensure that each unit is installed at the same level.

Figure 10: Connection - several devices in parallel mode -



Step 1



Parallel circuit board

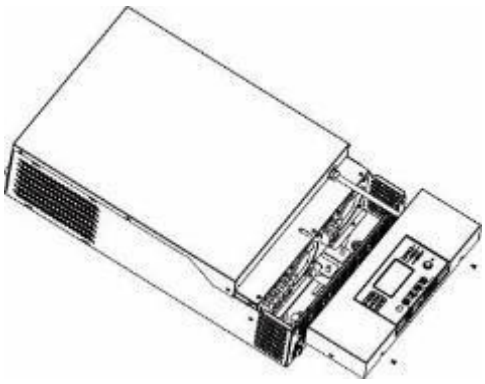
Parallel communication cable

Current sharing cable

In the Parallel Kit, you find the following items in the package (only for AX-M2 3000-24).

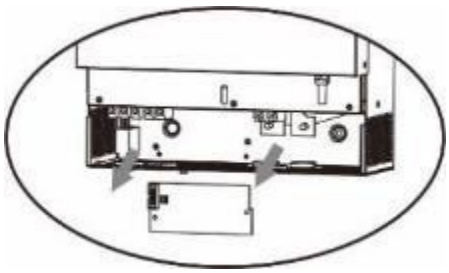
The parallel circuit board is already installed in AX-M2 5000-48 in the inverter as standard).

Step 2



Remove the lower housing by removing both screws.

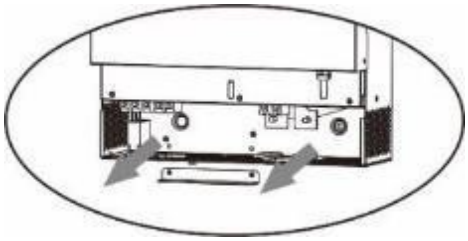
Step 3

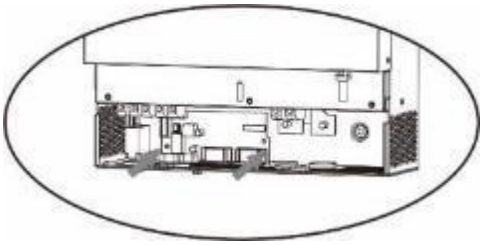


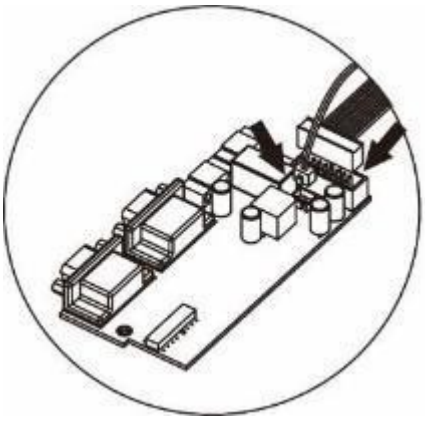
Remove the two screws as illustrated below.

Remove the 2-pole cable and 14-pole cable.

Remove the cover under the communication board.

Step 4	
	Remove both screws. Remove the cover of the parallel communication unit.

Step 5	
	Install the new parallel circuit board. Secure the parallel circuit board with 2 screws.

Step 6	
	Connect the 2-pole and 14-pole cable again with the parallel circuit board. Mount the cover on the device again. - The inverter is ready for the parallel mode!

9.5.1 Wiring instructions

CAUTION

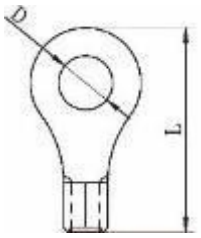
Ensure that the lengths of all battery cables are equal. Otherwise, there is a voltage difference between the inverter and battery which will cause the parallel inverter to not function.

CAUTION

Install a fuse on the battery and AC input side. This ensures that the inverter can be safely disconnected during maintenance work.

Recommended battery cable terminal size for each inverter:

Model	Cable size	Ring cable lug			Tighten-ing torque
		Cable mm2	Measurements D (mm)	L (mm)	
3KW	1*70mm²	70	6.4	49.7	2~3 Nm
	2*25mm²	25	6.4	49.7	
5KW	1*70mm²	70	6.4	49.7	2~3 Nm
	2*25mm²	25	6.4	49.7	



Recommended AC input and output cable size for each inverter:

Model	AWG	Tightening torque
3KW	6mm²	1.2~1.6Nm
5KW	10mm²	1.4~1.6Nm

Recommended power switch specification of the battery for each inverter:

Model	
3KW	150A/60VDC
5KW	125A/80VDC

If you would like to use only one fuse on the battery side for the entire system, the nominal value of the fuse should be the n-fold of the current of 1 device. "X" stands for the number of inverters switched on in parallel mode.

Recommended fuse specification for the AC input:

Model	1 Devices	2 Devices	3 Devices	4 Devices	5 Devices	6 Devices	7 Devices	8 Devices	9 Devices
3KW	40A	80A	120A	160A	200A	240A	280A	320A	360A
5KW	50A	100A	150A	200A	250A	300A	350A	400A	450A

Recommended battery capacity:

Number of inverters in parallel	2	3	4	5	6	7	8	9
Battery capacity	800Ah	1200Ah	1600Ah	2000Ah	2400Ah	2800Ah	3200Ah	3600Ah

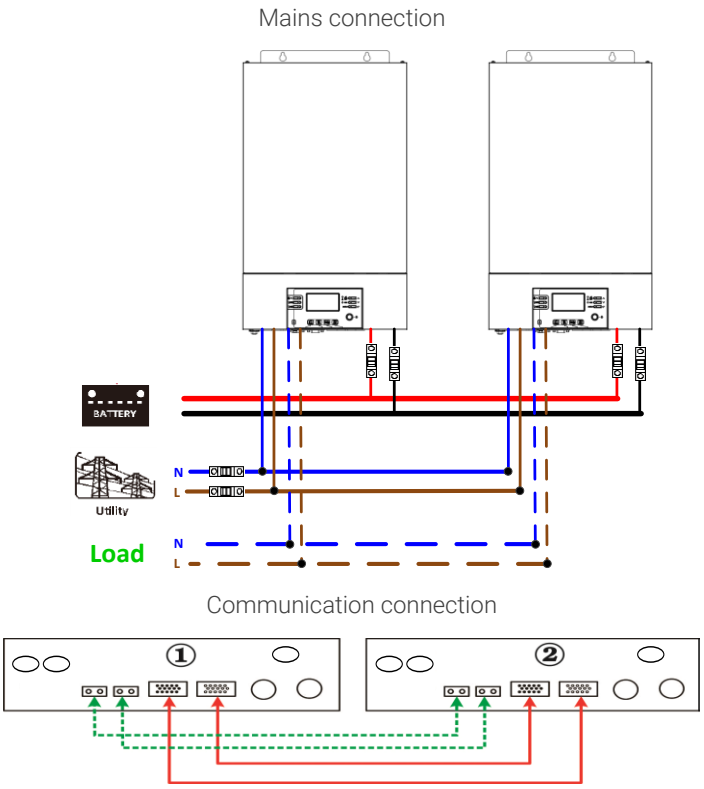
Ensure that all inverters use the same battery bank. Otherwise, the inverters will switch to the error mode.

9.5.2 Connection examples

9.5.2.1 Parallel operation 1-phase

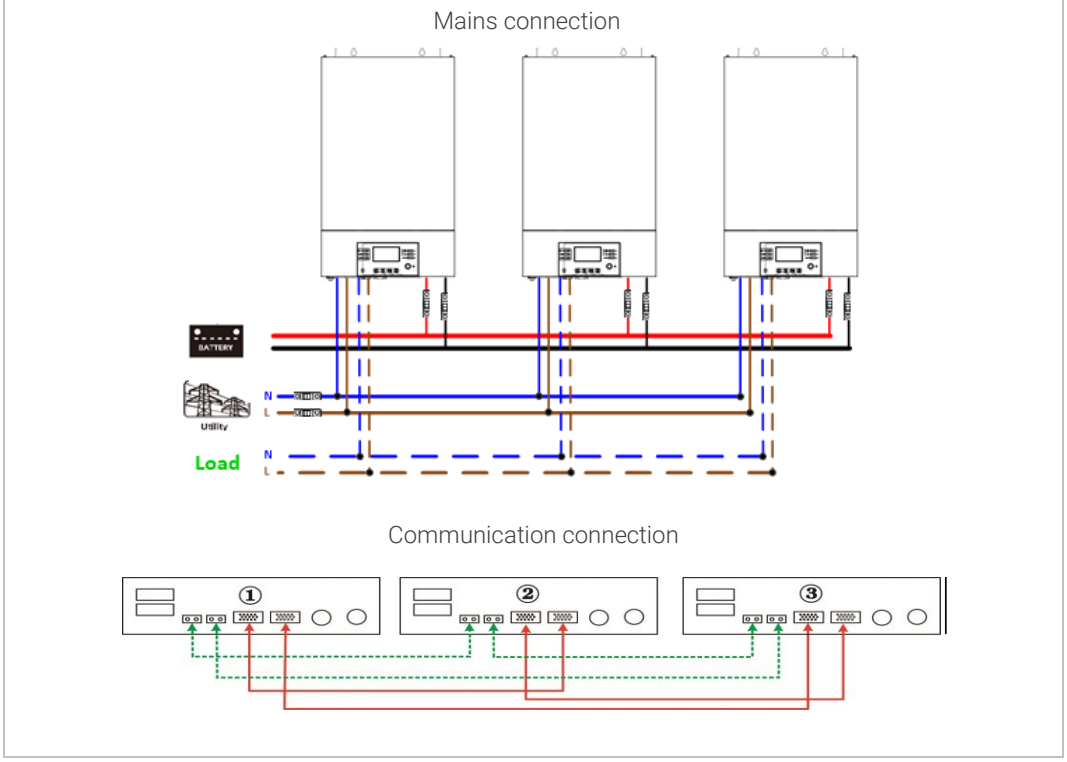
2x inverters in parallel:

Figure 11: Connection - Several devices in parallel mode - Connection examples



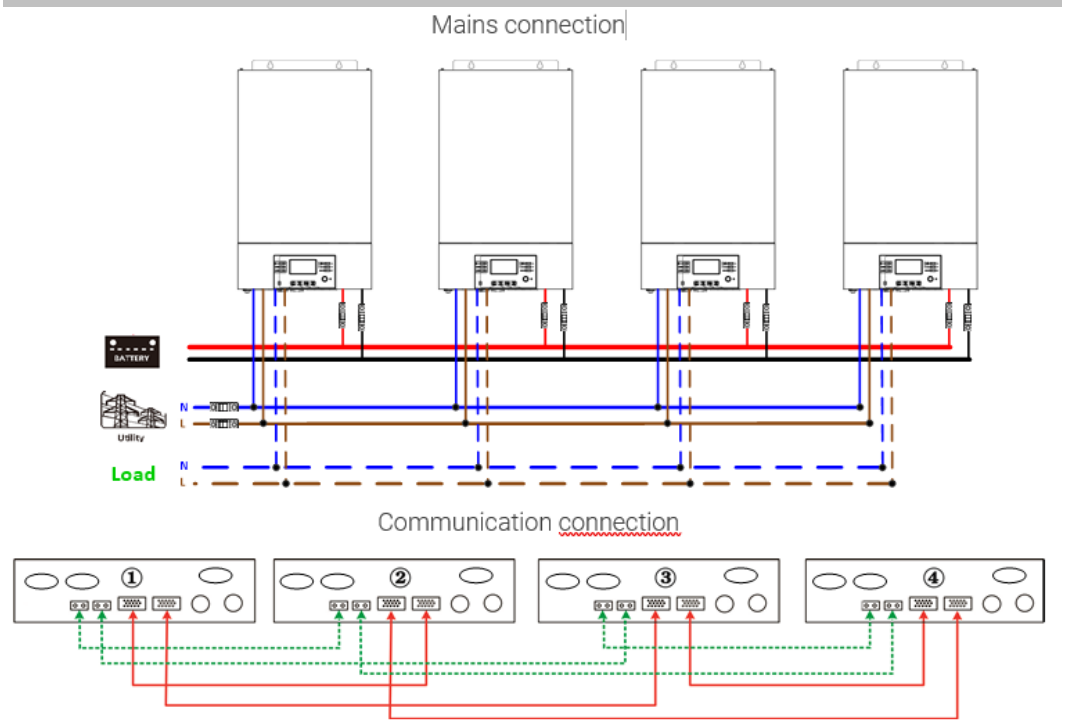
3x inverters in parallel:

Figure 12: Connection -Several devices in parallel mode -Connection examples -



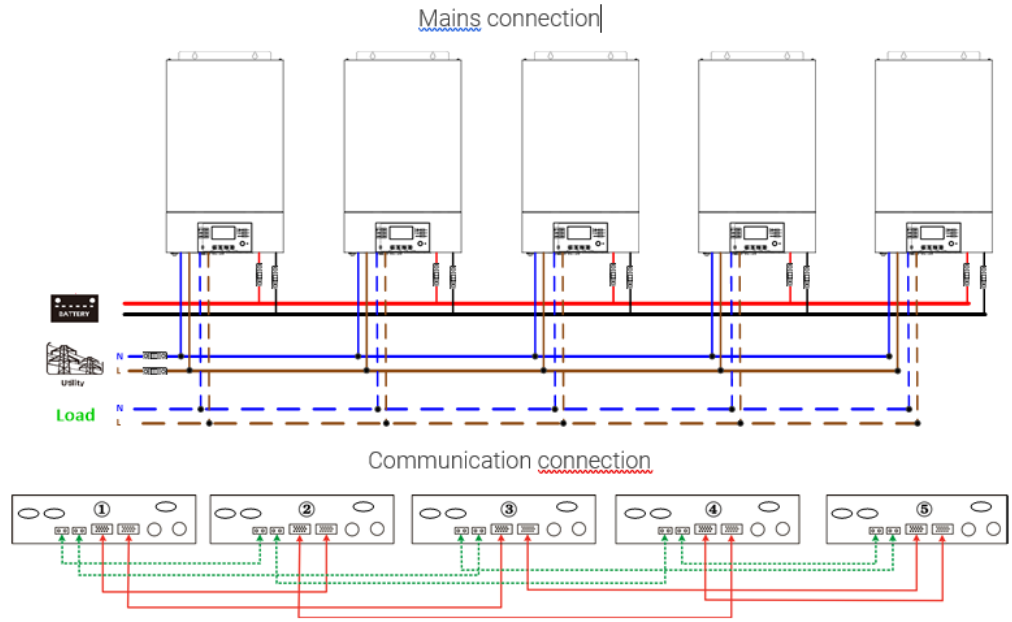
4x inverters in parallel:

Figure 13: Connection -Several devices in parallel mode -Connection examples -



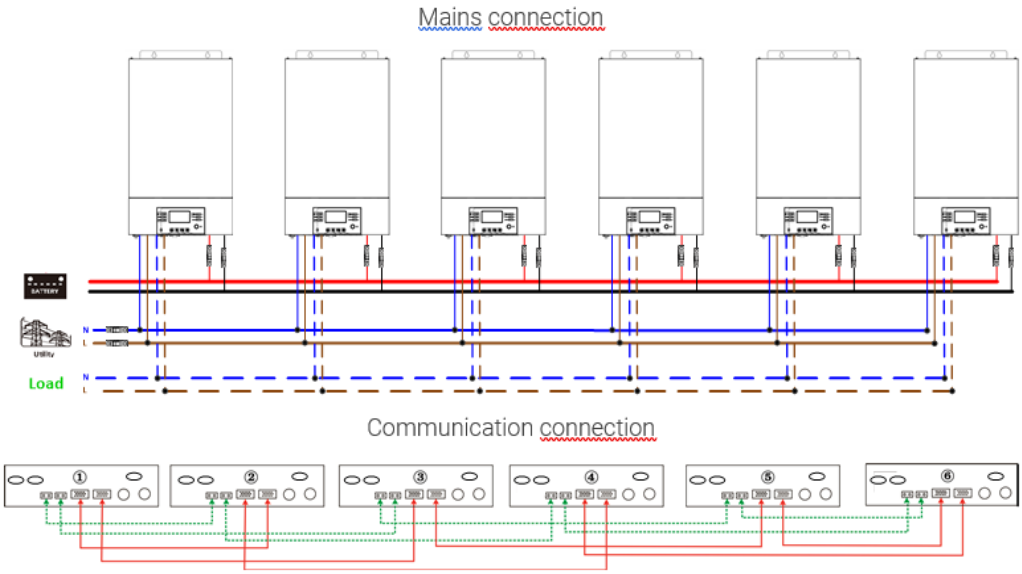
5x inverters in parallel:

Figure 14: Connection -Several devices in parallel mode -Connection examples -



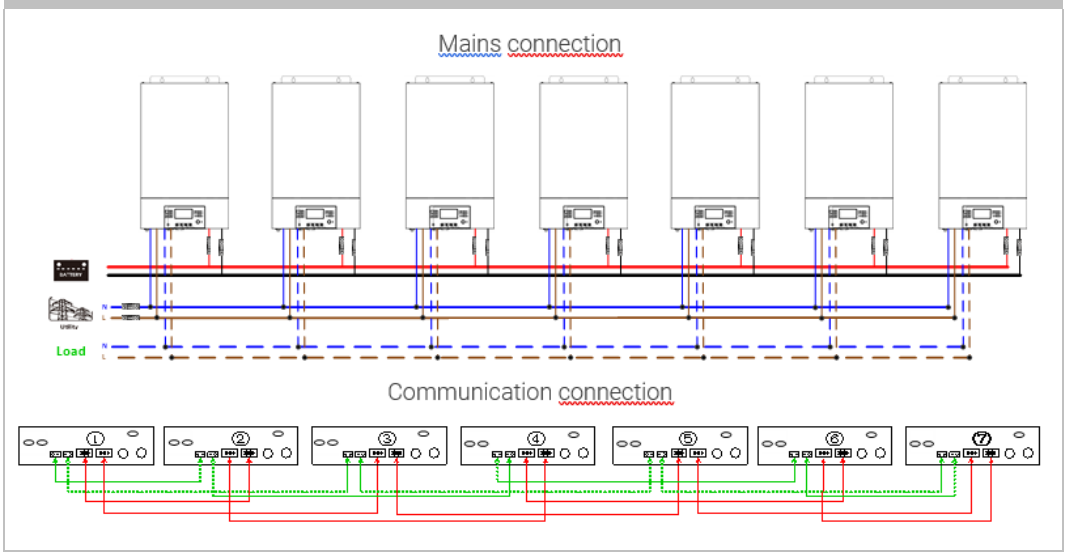
6x inverter in parallel:

Figure 15: Connection -Several devices in the parallel mode -Connection examples -



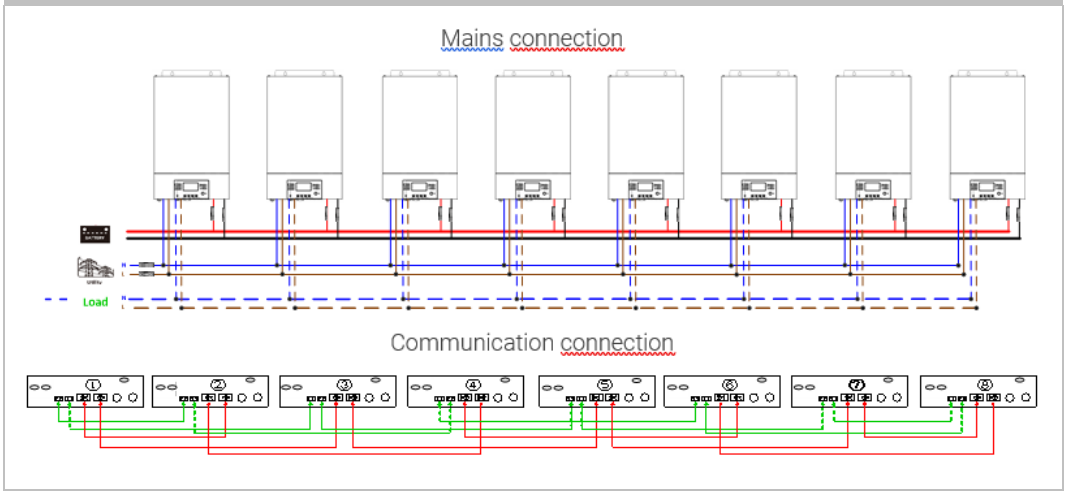
7x inverters in parallel:

Figure 16: Connection -Several devices in parallel mode - Commenction examples -



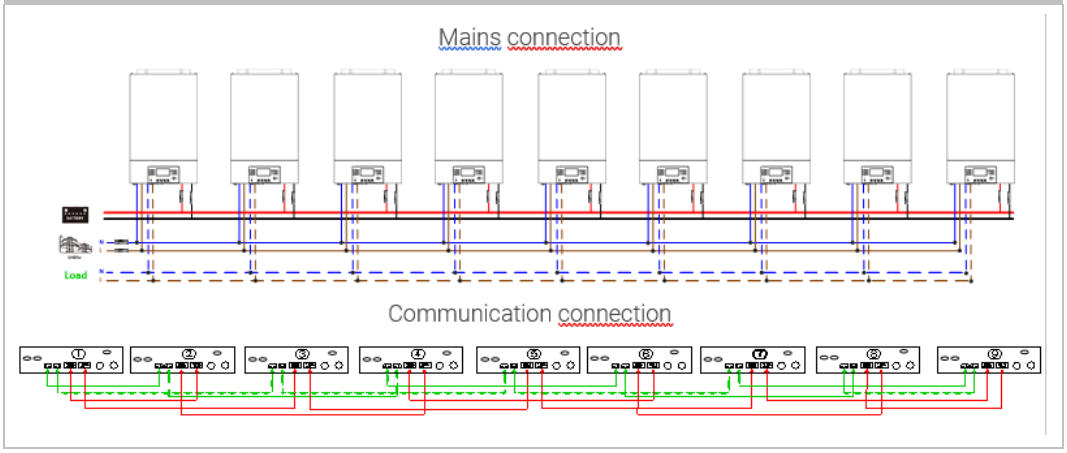
8x inverters in parallel:

Figure 17: Connection -Several devices in parallel mode -Connection examples -



9x inverters in parallel:

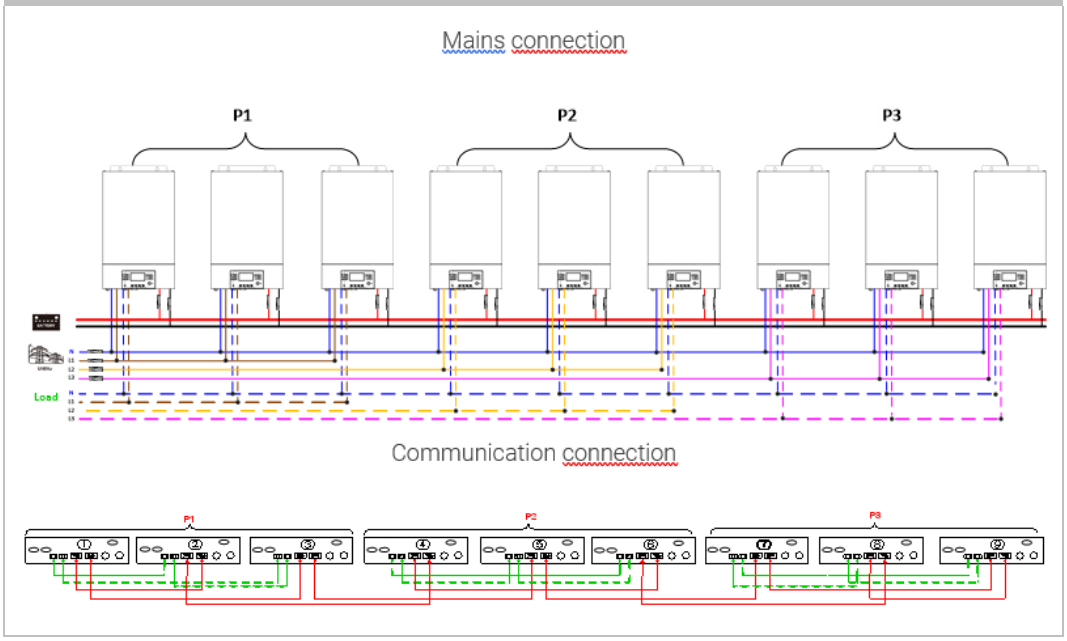
Figure 18: Connection - Several devices in parallel mode -Connection examples -



9.5.2.2 Parallel operation 3-phase

3x inverters in each phase:

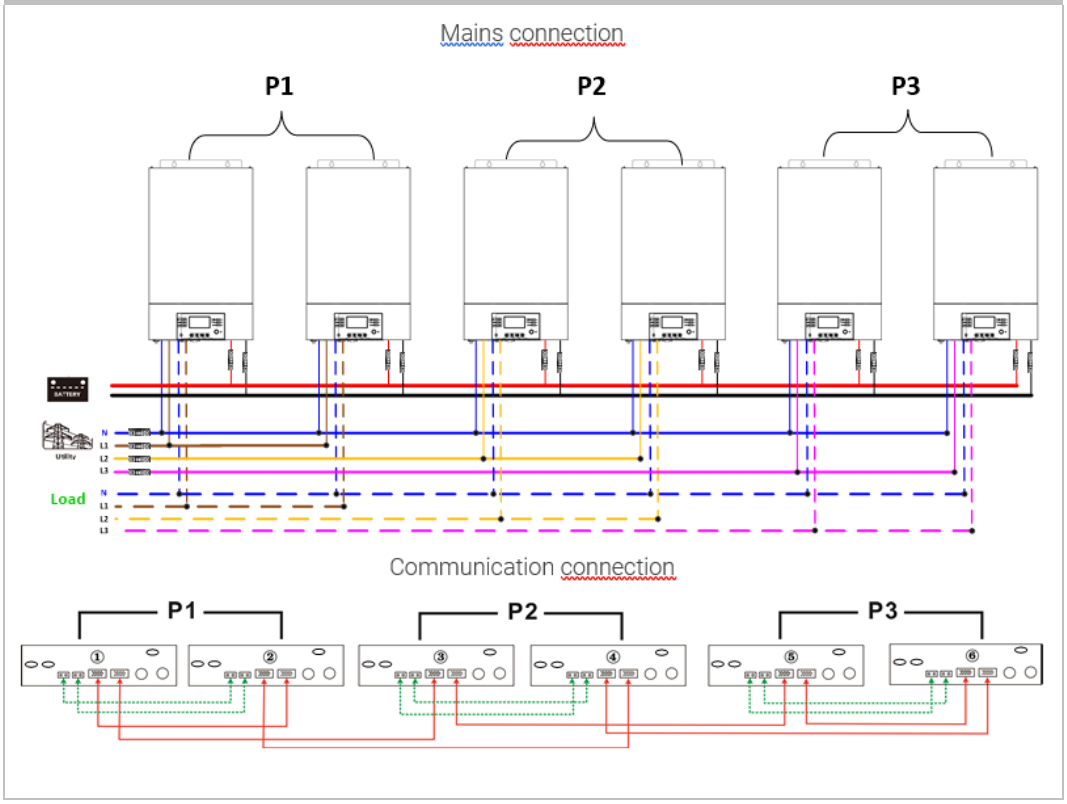
Figure 19: Connection -Several devices in parallel mode -Connection examples -



WARNING: Do not connect the current sharing cable between the inverters that are in different phases. Otherwise, this can lead to damages to the inverters.

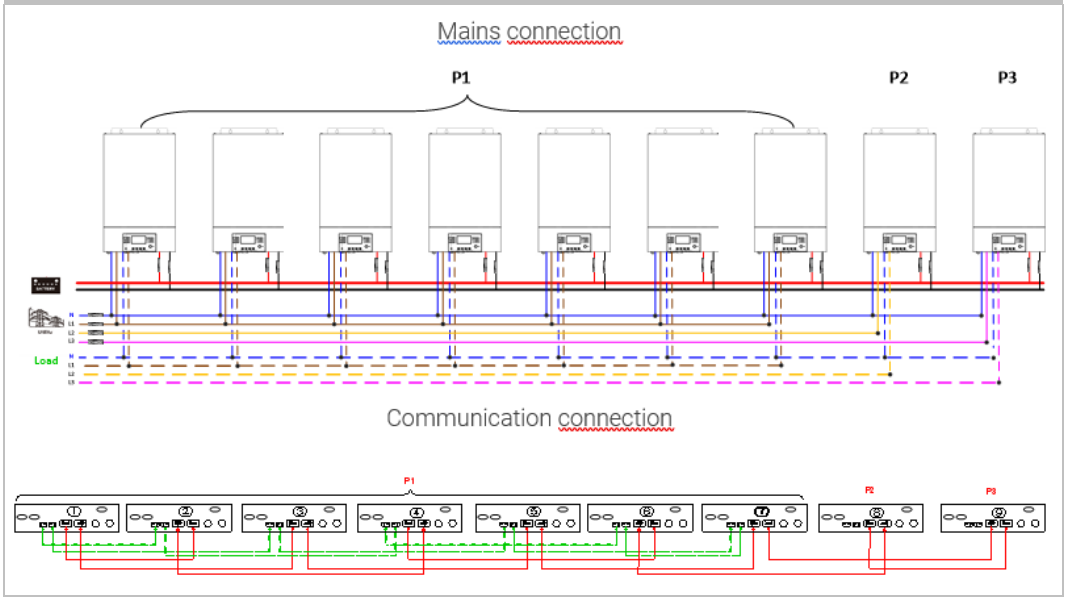
Two inverters in each phase:

Figure 20: Connection -Several devices in parallel mode -Connection examples -



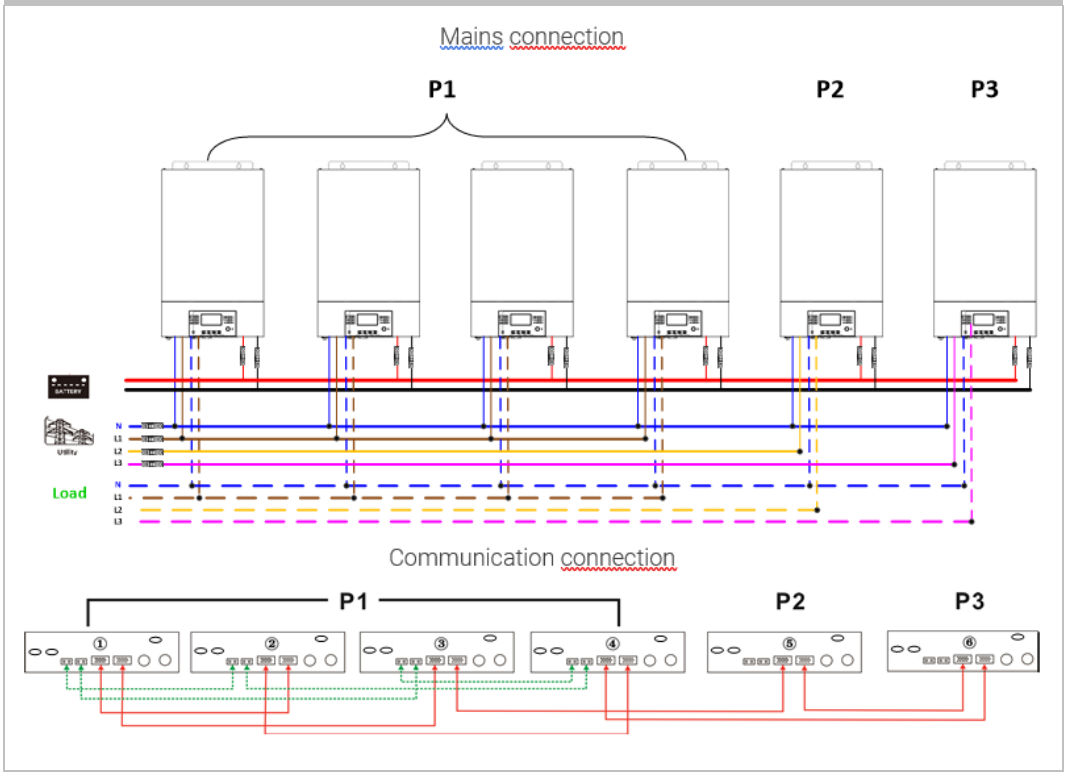
Seven inverters in one phase and each with one inverter for the other two phases:

Figure 21: Connection -Several devices in parallel mode -Connection examples -



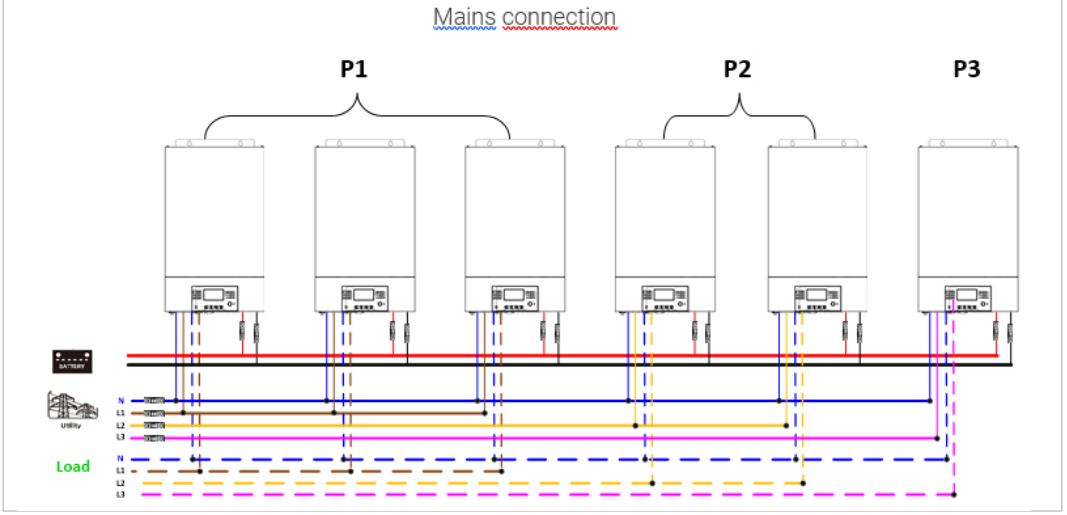
Four inverters in one phase and each with one inverter for the other two phases:

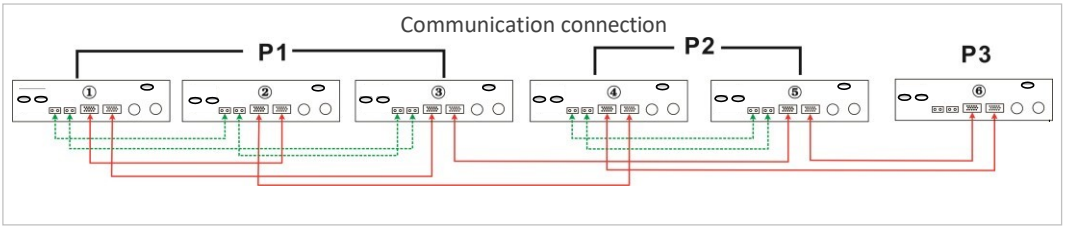
Figure 22: Connection -Several devices in parallel mode -Connection examples -



Three inverters in one phase, two inverters in the second phase and one inverter for the third phase:

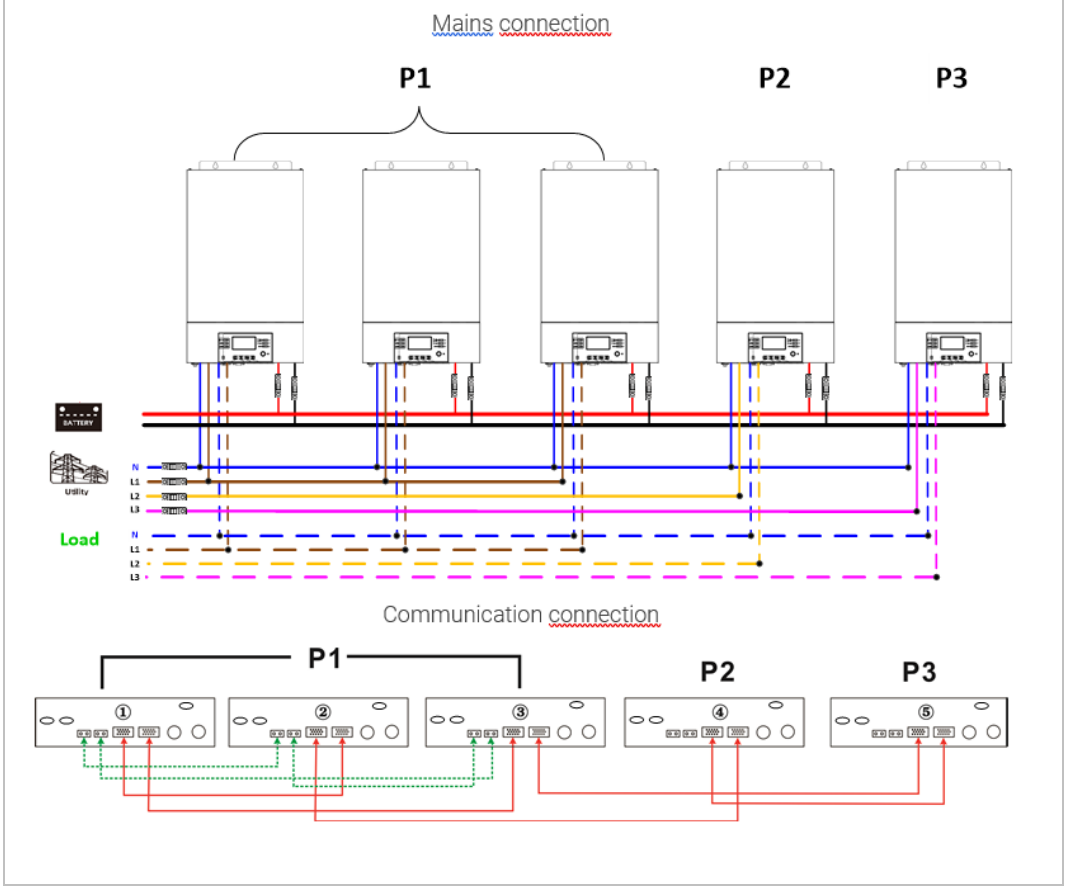
Figure 23: Connection -Several devices in parallel mode -Connection examples -





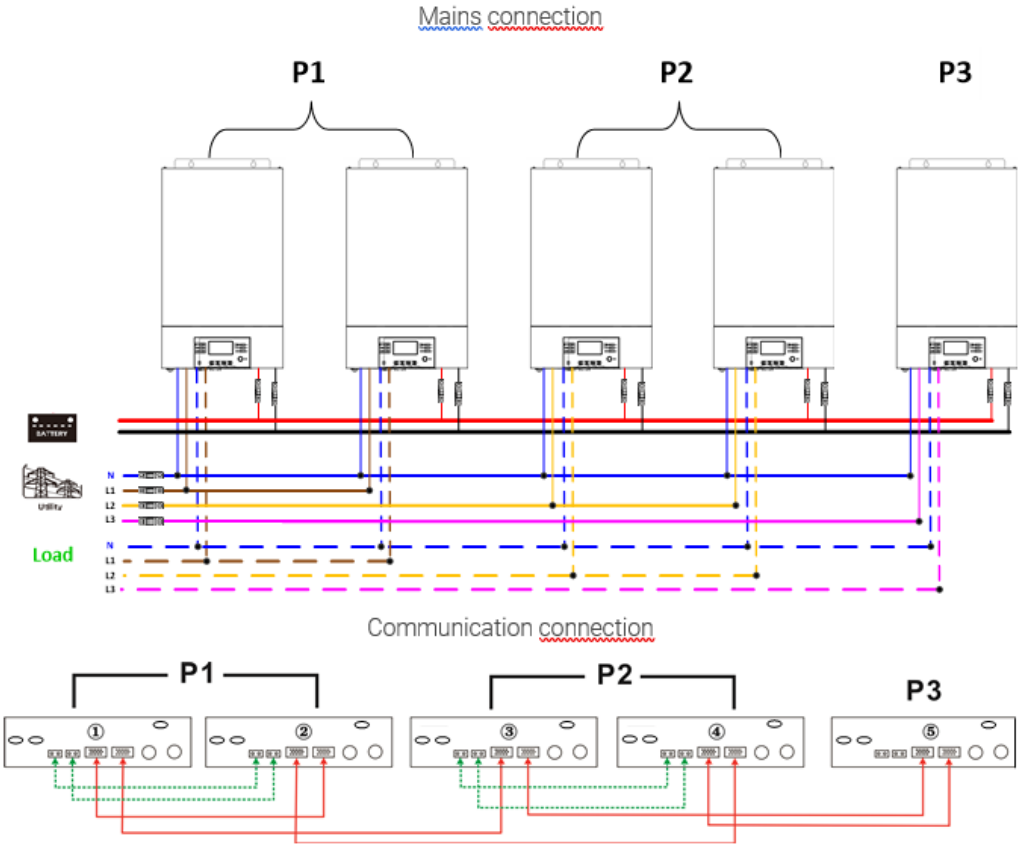
Three inverters in one phase and only one inverter each for the remaining two phases:

Figure 24: Connection - Several devices in parallel mode - Connection examples -



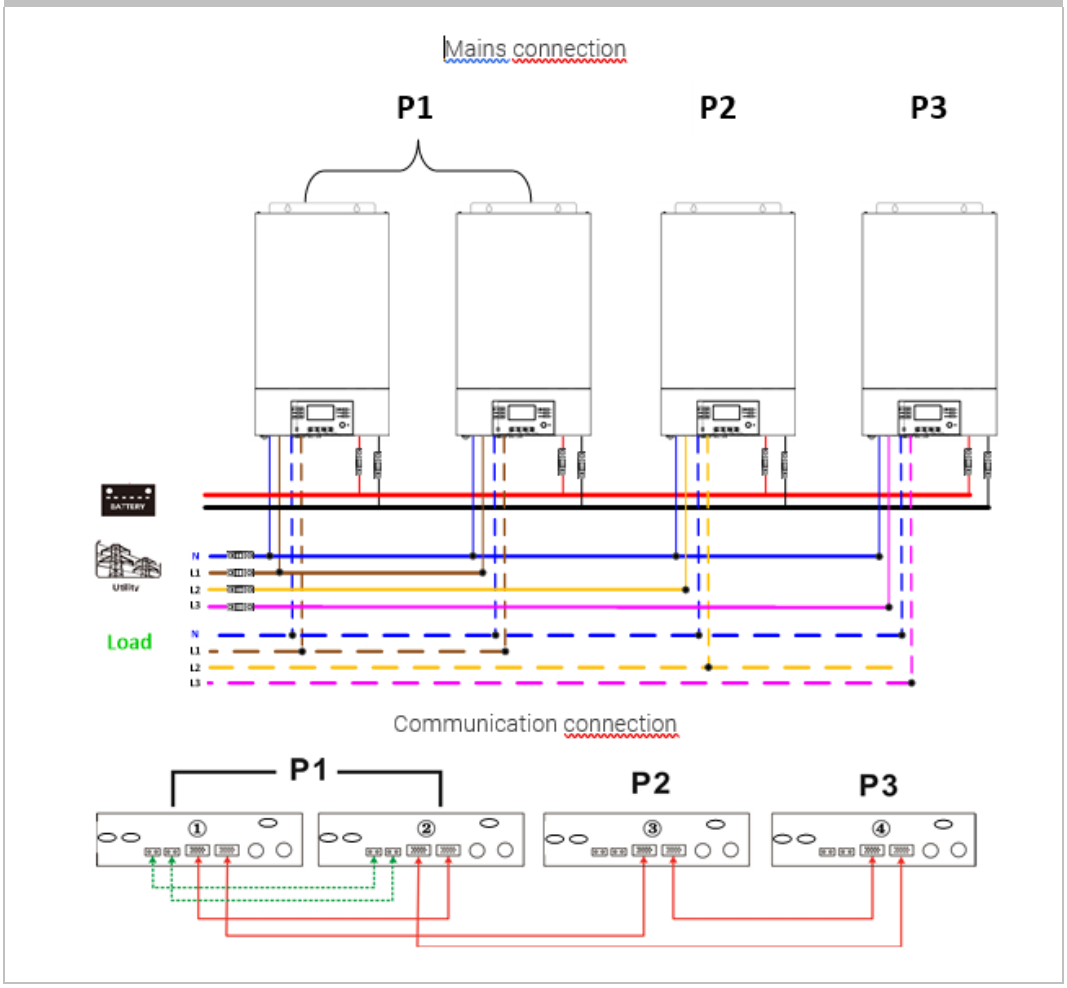
Two inverters in two phases and only one inverter for the remaining phase:

Figure 25: Connection -Several devices in parallel mode -Connection examples -



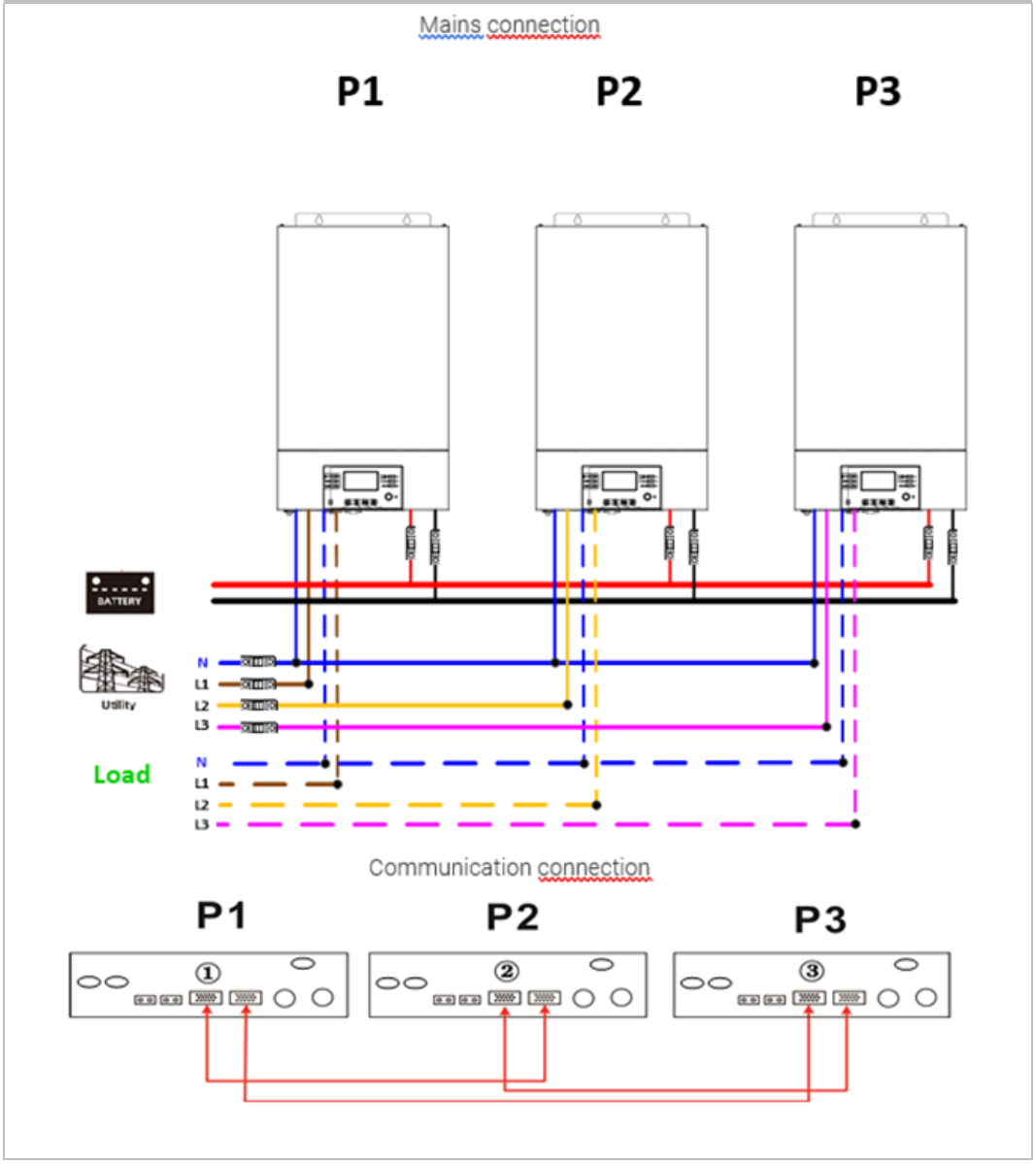
Two inverters in one phase and only one inverter each for the residual phases:

Figure 26: Connection -Several devices in parallel mode -Connection examples -



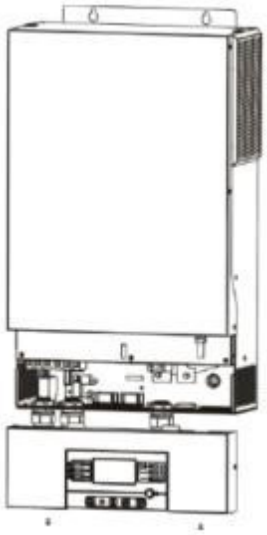
One inverter in each phase:

Figure 27: Connection -Several devices in parallel mode -Connection examples -



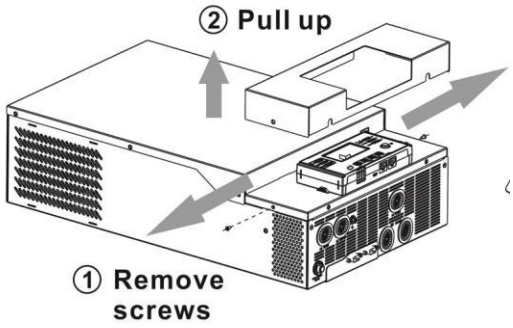
WARNING: Do not connect the current sharing cable between the inverters that are in different phases. Otherwise, this can cause damage to the inverters.

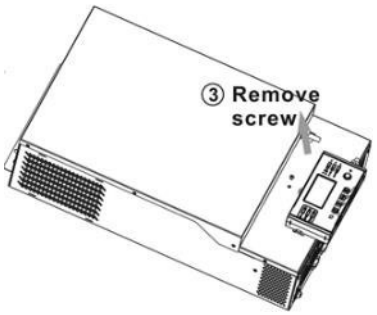
9.6 Connecting the installation

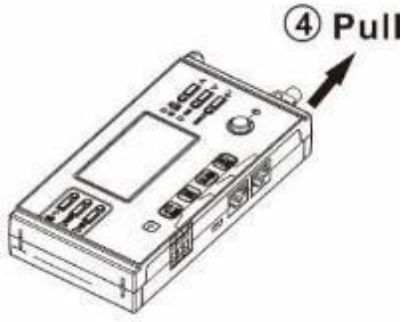
Step 1	
	Once you have connected all the cables, reattach the bottom cover. Mount the cover using the two screws.

9.7 Installing the remote display panel

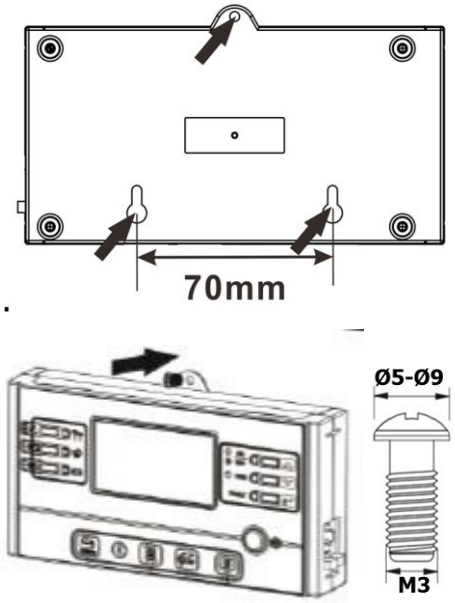
The LCD panel can be installed at a different site with an optional communication cable.

Step 1	
	Remove the screws on both sides of the lower housing. Pull the housing cover up.

Step 2	
	Remove the screws from the top of the display field. Remove the display from the housing bottom.

Step 3	
	Pull the cable out from the remote communication port.

Step 4



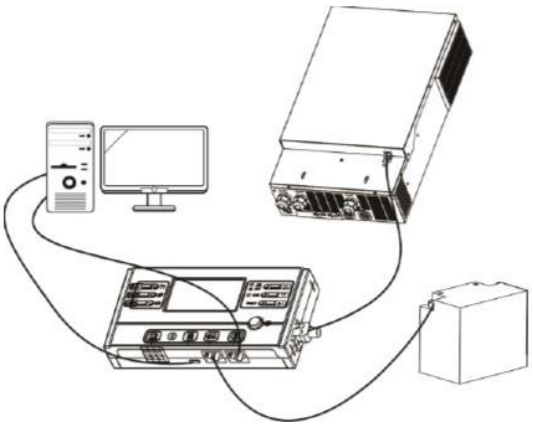
Mount the adapter plate.

Drill two holes (distance 70 mm) on the preferred location.

Secure the adapter plate here.

Place the panel on the adapter plate and secure it with a suitable screw:

Step 5



Connect the LCD panel with the inverter. Use the communication cable for this purpose.

9.8 Additional communication connections

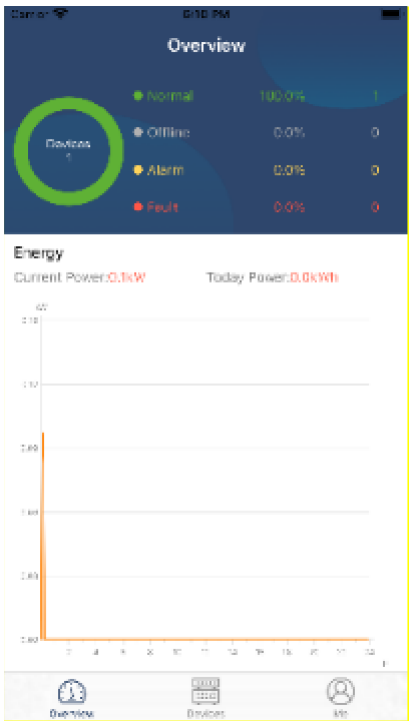
9.8.1 Serial connection

A serial communication cable can be used to connect a PC to the solar inverter. This requires monitoring software. This is found on the enclosed CD. To install the monitoring software, you must insert the accompanying CD into a computer. Follow the instructions on the screen. You can find details about the operation in the user manual for the software on the CD.

9.8.2 Wi-Fi connection

The solar inverter is equipped with a Wi-Fi transmitter. The WLAN transmitter makes wireless communication between the solar inverter and a monitoring application possible. You can find the WatchPower app in the Apple® Store or the WatchPower Wi-Fi app in the Google® Play Store.

Abbildung. 1: Connection -Additional communication connections -Wi-Fi connection -

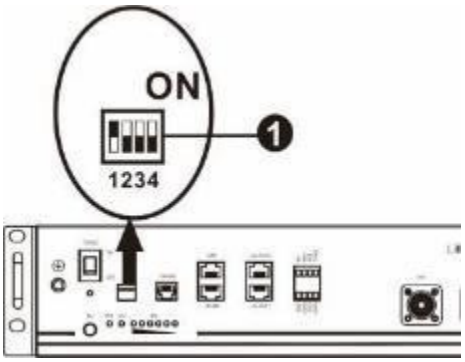


9.8.3 Battery Management System (BMS)

A special communication cable must be used when connecting a lithium battery. For Pylontech-Lithium-batteries it is closed with the inverter. The plug labeled “Pylon” must be connected to the battery.

The special RJ45 communication cable sends information and signals between the lithium battery and the inverter. The following information and signals are exchanged via the special RJ45 communication cable:

- Configuration of the charging voltage, the charging current and the battery termination voltage.
- Start or stop the charging process according to the status of the lithium battery.

Step 2	
	▪ There are 4 ADD switches to define baud rates and battery group addresses. ▪ When the switch position is turned downward for the OFF position, this indicates "0." When the switch position is turned upward for the ON position, this indicates "1." ▪ Dip 1 is ON to represent the baud rate 9600. ▪ Dip 2, 3 and 4 set up the battery group address. ▪ Dip switches 2, 3 and 4 on the master battery (initial battery) set up or change the group address.

Dip1	Dip2	Dip3	Dip4	Group address
1:RS485 Baud rate=9600 Restart required.	0	0	0	Only a single group. It is necessary to set up the master battery with this setting. The slave batteries are not restricted.
	1	0	0	Operation for several groups. In this setting, the master battery must be set up in the first group. The slave batteries are not restricted.

	0	1	0	Operation for several groups. In this setting, the master battery
				must be set up in the second groups. The slave batteries are not restricted.
	1	1	0	Operation for several groups. In this setting, the master battery must be set up in the third group. The slave batteries are not restricted.
	0	0	1	Operation for several groups. In this setting, the master battery must be set up in the fourth group. The slave batteries are not restricted.
	1	0	1	Operation for several groups. In this setting, the master battery must be set up in the fifth group. The slave batteries are not restricted.

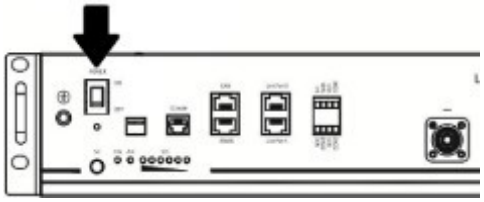
The maximum number of battery groups is 5.

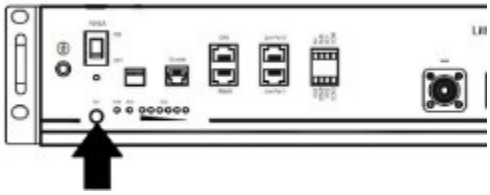
9.8.3.1 Installing battery type PLYONTECH

Step 1 ©	
 Part-number: vo43-101203-02G	Use the enclosed specially manufactured RJ45 cable to connect the inverter and the lithium battery. The plug labeled “PYLON” must be connected to the RS485-port of the battery.

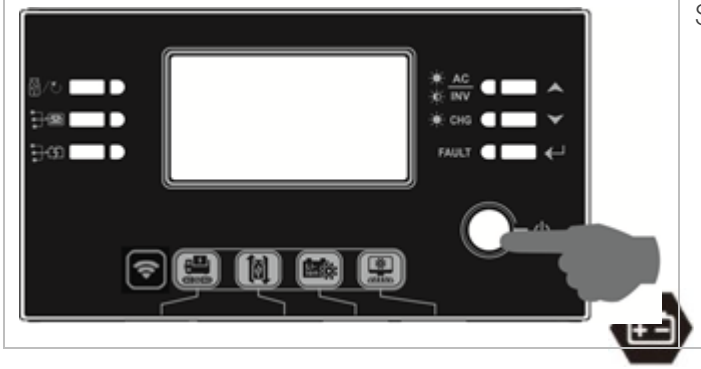
Please take notice for parallel system:

1. Only support common battery installation.
2. Use one custom-made RJ45 cable to connect any inverter (no need to connect to a specific inverter) and lithium battery. Simply set battery type of this inverter to “PYL” in LCD program. The remaining inverters are set as “USE”.

Step 2	
	Switch the lithium battery on.

Step 3	
	Press the [Start] button on the lithium battery for ca. three seconds ▸ *The lithium battery is activated.* ▸ *The output power is ready.*

Step 4



Switch the inverter on.

Step 5

Select the PYL battery type (see Program 5, Chapter 6.2).

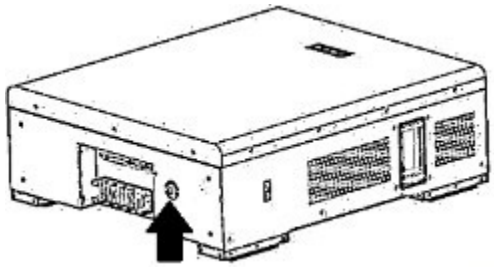
Wait ca. 60 seconds.

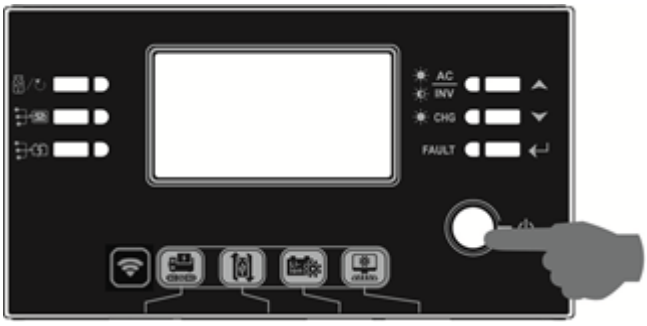
- *If the communication between the inverter and the battery is successful, the battery symbol blinks*

  on the LCD display.

9.8.3.2 Installing battery type WECO

Step 1 ©	
	Use a specially manufactured RJ45cable to connect the inverter and the lithium battery.

Step 2	
	Switch the lithium battery on.

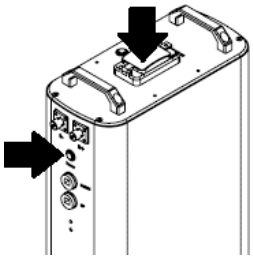
Step 3	
	Switch the inverter on.

Step 4	
	Select the WEC battery type (see Program 5, Chapter 6.2). Wait ca. 60 seconds.

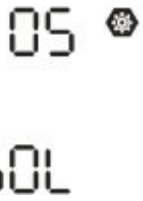
	▸ If the communication between the inverter and the battery is successful, the battery symbol blinks  on the LCD display.

9.8.3.3 Installing battery type SOLTARO

Step 5 ©	
	Use a specially manufactured RJ45 cable to connect the inverter and the lithium battery.

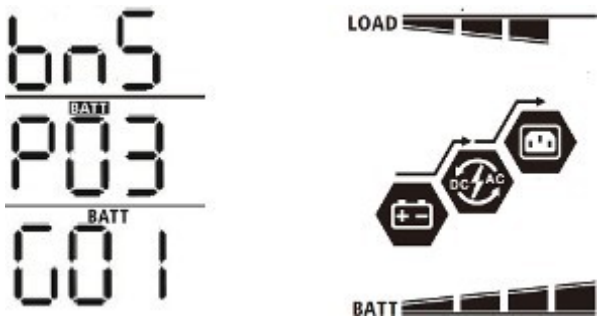
Step 6	
	Open the DC circuit breaker and switch on the lithium battery.

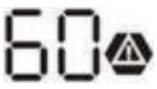
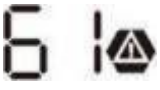
Step 7	
	Switch the inverter on.

Step 8	
	Select the SOL battery type (see Program 5, Chapter 6.2). Wait ca. 60 seconds. *If the communication between the inverter and the battery is successful, the battery symbol blinks in the LCD display.*

9.8.4 LCD display information

Press on the UP or DOWN button to switch the LCD display information. The battery pack number and the battery group number will be displayed by the main CPU version test as shown below.

Selectable information	LC display
Battery pack number and battery group number	Battery pack number =3, Battery group number =1 

Code	Description
	If the battery status cannot be charged and discharged through successful communication between the inverter and the battery, the code 60 is displayed to stop the charging and discharging of the battery.
	Communication is interrupted (only available if the battery type is set to "Pylontech battery"). Once the battery is connected, the communication signal is not recognized for 3 minutes.

	The buzzer beeps. After 10 minutes, the inverter stops charging and discharging the lithium battery. The loss of communication occurs once the inverter and the battery are successfully connected. The buzzer sounds immediately.
	If the battery status cannot be charged through successful communication between the inverter and the battery, code 69 is displayed to stop the charging of the battery.
	If the battery status must be charged after the communication between the inverter and the battery was successful, code 70 is displayed for the charging of the battery.
	If the battery status cannot be discharged through successful communication between the inverter and the battery, code 71 is displayed to stop the discharging of the battery.

9.8.5 Dry contact

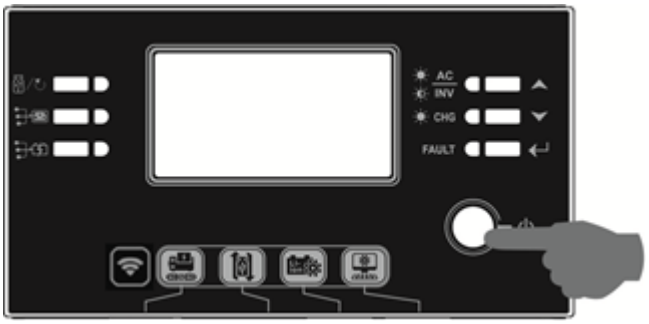
There is a dry contact (3A/250VAC)on the back of the device. It can be used to send signals to an external device when certain conditions are met:

Status	Operation	Dry contact port: 	
		NC&C	NO&C
Switching off *Power Off*	Device is switched off and no output is supplied with power.	closed	open
Switching on *Power On*	The output is supplied with power via the mains power supply.	closed	open

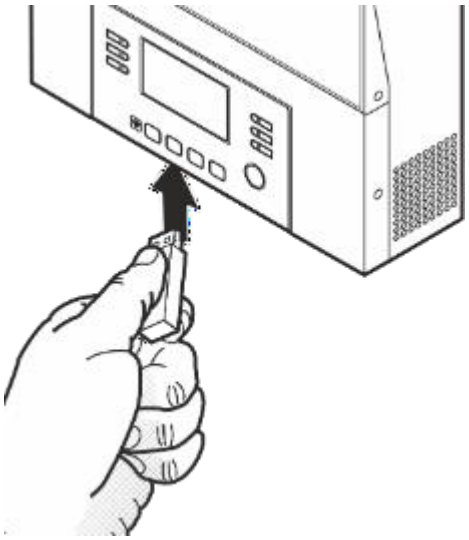
	The output is operated with battery power or solar energy.	Program 01 set as USB (Mains first)	Battery voltage < low DC warning voltage	open	closed
			Battery voltage > Setting in Program 13 or battery charging reaches state of suspension	closed	open
		Program 01 set as SBU (SBU priority) or SUB (solar first)	Battery voltage < Setting in Program 12	open	closed
			Battery voltage > Setting in Program 13 or battery charging reaches state of suspension	closed	open

10 Operation

10.1 Switching on device

Step 1	
	If the device has been installed properly and the batteries are connected properly, press the on/off button to switch on the device.

10.2 Update inverter firmware (if recommended)

Step 1	
	Please plug the USB storage in the USB port( ). Press the button /↻ for 3 seconds to get to the USB function setting mode.

Step 2	
	Press the button /↻ . This function updates the inverter firmware.

10.3 Rewriting internal parameters

⚠ ATTENTION

Function disturbances due to improper parameter values!

Unauthorized changes in the setting can lead to serious function disturbances.

- Parameter changes are only permitted to be carried out by EFFEKTA GmbH service personnel.

Step 1	
	Press the button . The aim of this function is to overwrite all the parameter settings (TEXTfile).

10.4 Export data protocol

Step 1	
	Press the button to export the data protocol from the inverter to the USB flash drive. When the selected function is ready, the LCD shows rdy Press the button to reconfirm the selection.

Step 2	
	Press the button ,to select "yes." ▸ *LED 1 blinks once per second during the process.* ▸ *Once this action has been completed, the display shows ; all LEDs light up!* Then press the button to return to the main screen. Or: Press the button to select "no" and return to the main screen. If a button is not pressed for 1 minute, the main screen is automatically displayed.

10.5 Install the Wi-Fi function with the mobile app

The Wi-Fi module can make wireless communication between the solar inverter and a monitoring platform possible.The main functions of the app are:

- Display device status during normal operation,
- Configure device settings,
- Inform users when a warning or an alarm occurs,
- Inform users of the operation data of the solar inverter.

10.5.1 Download and install

Step 1	
Android Apple	Please scan the following QR code with your smartphone. Download the WatchPower app.

Step 2

Once installed, tap on the connection symbol to open the software.

Tap on "Registration" on the screen to carry out the user registration.

Step 3

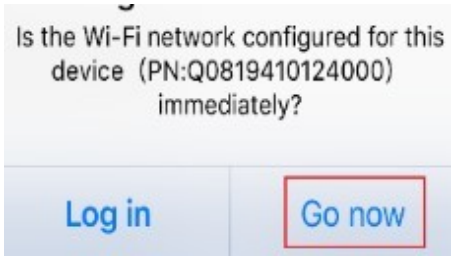
Enter all the required information.

Scan the remote box PN by tapping on the symbol.

Then tap on the "Registration" button.

The "Registration successful" message will appear.

Step 4



Tap on "Go now" to continue with establishing the local Wi-Fi network connection.

Step 5

Follow the instructions.

Step 6

Select the network "Q0 ..."

Step 7

Enter the standard password "12345678."

Step 8

Tap on the button

if the WiFi module is successfully connected.

Step 9

Tap on the 

symbol to select the name of your local Wi-Fi router (to access the Internet) and enter the password.

Step 10	
	Tap on "Confirm" to complete the Wi-Fi configuration.

10.5.2 Register

Step 1	
	Enter the user name and password to register. Check "Remember me" so that you do not need to sign in again.

Step 2

After successful registering, you can access the "Overview" page to gain an overview of your monitoring devices, such as, e.g. :

- *general operation situation*
- *energy information*
- *current capacity*
- *today's capacity*

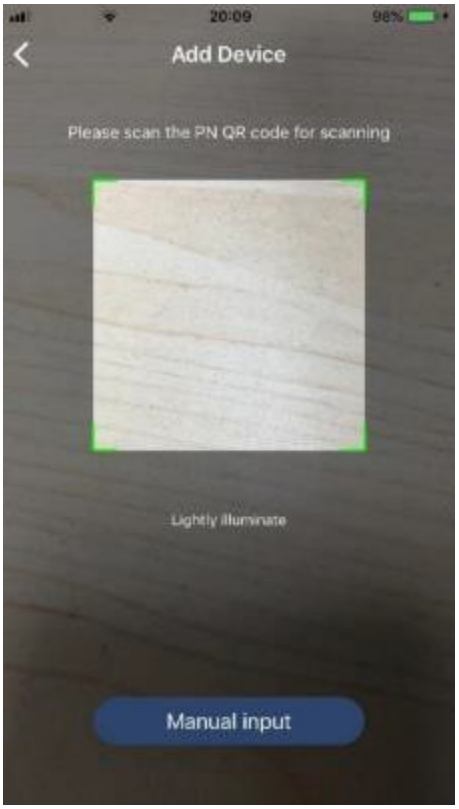
10.5.3 Add devices

Step 1

Tap on the symbol (below) to call up the page with the device list.

Tap on the symbol, upper right, to add a new device.

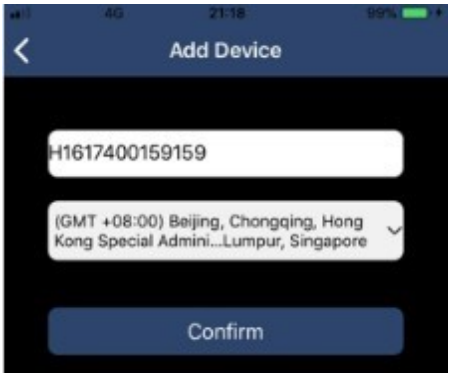
Step 2



Scan the barcode on the device.

The barcode is located on the underside the display panel.

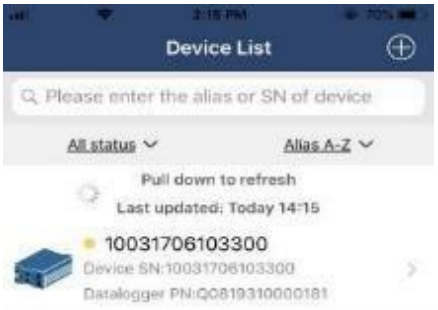
Step 3



Tap "Confirm" after the scanning the part number to add this device to the device list.

10.5.4 Display operation modes

Step 1



On the page with the device list, you can pull down the list to refresh the device information.

Enter any device for which you would like to retrieve the real-time status.

Step 2

A dynamic image is featured on the screen above.

[Standby mode] The inverter does not supply the load with power until the ON switch has been pressed. The mains power supply or a PV source can charge the battery in the standby

mode.

Step 3

[Line mode] The inverter supplies the load via the mains power supply or without a PV source. The mains power supply or a PV source can charge the battery on standby mode.

Step 4

[Battery mode] The inverter supplies the load from the battery with or without a PV source. Only a PV source can charge the battery.

10.5.5 Display error and warning messages

Schritt 1	
	Tap on the symbol in the upper right corner to call up the device alarm page. Then you can check the alarm history and detailed information.

10.5.6 Change the device name

Step 2	
	Tap on the symbol in the upper right corner. ▸ *An empty text box appears!* Change the name of your device and tap on "Confirm."

10.5.7 Change the device settings

Step 1

[Basic information] shows the basic information pertaining to the inverter:

- *AC voltage*
- *AC frequency*
- *PV input voltage*
- *Battery voltage*
- *Battery capacity*
- *Charging current*
- *Output voltage, etc.*

[Production information]shows the model type (inverter type)

- *Main CPU version*
- *Wi-Fi CPU version and*
- *Secondary CPU version, etc.*

[Rated information]shows information on

- *Nominal voltage,*
- *Nominal current,*
- *Nominal battery voltage,*
- *Nominal output voltage, etc.*

[History]shows the history of the device data.

[Wi-Fi module information]shows the PN, status and firmware version of the Wi-Fi module.

Parameters

Step 1

Functions are activated and parameters for the inverter are set on this page.

There are three options for changing the settings

- List options for changing the values by tapping on one of them.
- Activate/deactivate functions by clicking on "activate" or "deactivate" on the screen.
- Change the values by clicking on the arrows or by directly entering the numbers in the column.

Every function setting is saved by clicking on the "Settings" screen.

Parameters overview

Parameters		Description
Output setting	Output source priority	This configures the priority for the load power source.
	AC input range	By selecting a UPS, it is permissable to connect a PC.
		Information is included in the product manual.
	Output voltage	Set the output voltage.
	Output frequency	For setting the output frequency.
Setting the battery parameters	Battery type	For setting the connected battery type.

	Battery cut-offvoltage	For setting the end-point voltage of the battery.
	Back to grid-voltage	Return to PV mode or inverter mode in the mains mode when the priority is set to SOL or SbU in menu point 01.
	Back to discharge voltage	Return to the inverter mode (autonomous) when the priority is set to SOL or SbU in menu point 01.
	Charger source priority	It configures the priority of the charger source.
	Max.charging current	It sets the battery charging parameters. The selectable values can vary in different inverter models. Information can be found in the product manual.
	Max.AC charging current	
	Float charging voltage	
	Bulk charging voltage	
	Battery equalization	Only available when USE is selected under 05.
	Activate battery equalizationin real time	An action in real time that activates the battery equalization.
	Equalized timeout	For setting the duration of the battery equalization.
	Equalizedtime extended	Setting the extended time for continuation of the battery equalization.
	Equalizing period	For setting the interval period of the battery equalization.
	Equalizing voltage	For setting the battery equalization voltage.

Activate/deactivate functions	LCD auto-return to main screen	When activated, the LCD screen automatically returns to the main screen after one minute.
	Fault code record	When activated, the fault, or error, code is recorded in the inverter when an error occurs.
	Backlight	When deactivated, the LCD backlight switches off when the control panel key is not activated for 1 minute.
	Bypassfunction	When activated, the device switches to line mode when an overload occurs in battery mode.
	Beepswhen primary source is interrupted	When activated, the buzzer sounds an alarm when the primary source is abnormal.
	Overtemperatureauto-restart	When deactivated, the device does not restart after the overtemperature has been rectified.
	Overload auto-restart	When deactivated, the device does not restart after an overload.
	Buzzer	When deactivated, the buzzer does not sound when an alarm/error occurs.
RGB LED Setting	Enable/disable	Switch all RGB LEDs on or off
	Brightness	Adapts the brightness of the lighting
	Speed	Adapts the lighting speed

	Effects	Changes the lighting effects
	Colorselection	Adapts the color selection to the power source to display the power source and the battery status.
Return to standard mode	This function returns all settings to the standard mode settings (default).	

11 Troubleshooting & Fault Clearance

If malfunctions or problems with the solar inverter or the accumulator arise, we request that you please contact our Customer Service (Service Hotline).

In the event this occurs, have the following information ready to ensure swift resolution:

- Model, series number and device configuration;
- Progress of issue and date/time when the issue first occurred;
- Information displayed in the LCD/LED area of the operation unit (status or warning and alarm message);
- Power supply status, load status, environmental conditions regarding temperature and dampness, ventilation conditions;
- Condition data, such as the age of the accumulator;
  Most importantly, be able to name the respective qualified contact persons for the clarification of the issue and its resolution.

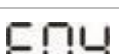
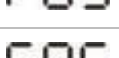
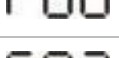
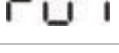
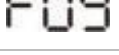
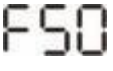
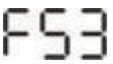
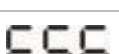
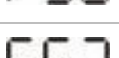
Service Hotline:

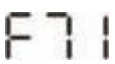
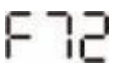
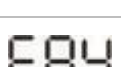
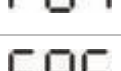
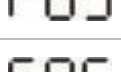
Telephone no.:
+49 / (0) 741 – 17451-27

Furthermore, we have set up an email contact address for you:solarteam@effekta.com

You can also learn about the relevant department or branch under the following web address.
http://www.effekta.com

11.1 Error mesages

Error	Description	Symbol
01	Ventilator is blocked or defective;	
02	Overtemperature	
03	Battery voltage is too high	
04	Battery voltage is too low	
05	Short circuit at output or overtemperature	
06	Output voltage is too high.	
07	Overload time detected	
08	Bus voltage is too high	
09	Bus soft start failed	
50	PFC overcurrent	
51	Overcurrent or current spike;	
52	Bus voltage is too low	
53	Inverter start-up failed	
55	AC output, DC voltage offset;	
56	Battery is not connected	
57	Current sensor malfunctioned	
58	Output voltage is too low	

Error code display	Description	Symbol
60	Back coupling protection	
71	Firmware version not compatible	
72	Error in current sharing	
80	Error in communication bus CAN	
81	Connection error	
82	Loss of synchronization	
83	Battery voltage recognized as different	
84	AC input voltage and frequency recognized as different	
85	Asymmetry of the AC output current	
86	The setting of the AC input mode is different	

11.2 Pylontech-battery warning messages

Be sure to use the original communication cable supplied with the inverter.

Code	Description
	If the battery status cannot be charged and discharged through successful communication between the inverter and the battery, the code 60 is displayed to stop the charging and discharging of the battery.
	Communication is interrupted (only available if the battery type is set to "Pylontech battery"). Once the battery is connected, the communication signal is not recognized for 3 minutes.

	The buzzer beeps. After 10 minutes, the inverter stops charging and discharging the lithium battery. The loss of communication occurs once the inverter and the battery are successfully connected. The buzzer sounds immediately.
	If the battery status cannot be charged through successful communication between the inverter and the battery, code 69 is displayed to stop the charging of the battery.
	If the battery status must be charged after the communication between the inverter and the battery was successful, code 70 is displayed for the charging of the battery.
	If the battery status cannot be discharged through successful communication between the inverter and the battery, code 71 is displayed to stop the discharging of the battery.

11.3 USB error message

Error	Description
	No USB device is recognized.
	USB hard drive.
	Document in USB device in incorrect format.

When an error occurs, the error code is only displayed for 5 seconds. After 5 seconds, the display automatically returns to the display screen.

11.4 Warning messages

Warning code	Description	Alarm signal	Symbol
01	Ventilator is blocked or defective	Three times per second	
02	Overtemperature	None	
03	Battery is overloaded	Beeps once per second	
04	Low battery status	Beeps once per second	
07	Overload	Beeps once every 0.5 seconds	
10	Output, capacity limit	Beeps twice every 3 seconds	
32	Communication interrupted	None	
E9	Battery equalization	None	
bP	Battery is not connected	None	

11.5 Troubleshooting options

Problem	LCD/LED/Buzzer	Possible causes	Resolution
The device switches itself off again immediately after the start-up process.	All displays and the buzzer are active for 3s and then switch off.	The battery bank voltage is too low: (<1.91V/cell)	• Load battery bank externally; • Reconnect battery bank; • Switch on;
No reaction after switching on.	No display.	The battery bank voltage is much too low, not connected or polarity-reversed.	Check the battery bank, the fuses and the connection.
Mains power available, device is in operation but in battery mode.	The input voltage is displayed as 0 on the LCD and the green LED is blinking.	The line protection has been activated.	Check the mains fuses and the connection.
	The green LED is blinking.	Poor quality of the grid or the generator.	1. Check the supply line 2. Check if the generator (if available) functions or if the setting for the input voltage range is correct.
	The green LED is blinking.	Set up "Solar first" as the priority of the output source.	Change the priority of the output source.
After switching on, an internal relay switch should be checked.	All displays light up periodically for a brief time.	The battery bank is not connected.	Check the battery bank, the fuses and the connection.

The buzzer beeps continuously and the red PED is blinking.	Error code 07	The inverter has detected an overload (>110%)	Reduce the load by switching off individual loads or try the bypass mode.
	Error code 05	Output short circuited.	Check the load network and remove defective loads. Check the air circulation, ventilators and room temperature (too high).
	Error code 02	Overtemperature on inverter (>100 °C).	Check the air circulation, ventilators and room temperature (too high).
	Error code 03	The battery bank is overloaded.	Switch the system off and check the inverter and the battery bank.
		The battery bank voltage is too high.	
	Error code 01	Ventilation error	Device must be repaired: ventilator replacement.
	Error code 06/58	Output is abnormal (inverter voltage < 190 or > 260VAC)	Attempt:Reduce the load. If this does not bring a change, the device must be repaired.
	Error code 09.08.53/57	Internal error.	Device must be repaired.
	Error code 50	PFC overcurrent or overvoltage.	Restart the device. If the error occurs again, contact a specialized service.
	Error code 51	Overcurrent or current spike.	
	Error code 52	DC intermediate circuit	

	Error code 55	Output voltage is asymmetrical.	
	Error code 56	Battery bank is not connected or the fuse has been activated.	Check the battery bank, the fuses and the connection. If unsuccessful, the device must be repaired.

Situation Error code	Description	Resolution
60	Power feedback in the inverters is disrupted.	* Restart the inverter * Check all connections * Are the current sharing connections properly wired?
61	Communication with the Pylontech battery is interrupted	* Check the cables
71	The firmware version of the inverter are not identical	* Check the firmware versions on each inverter * Update all inverters to the same firmware
72	The output current of the inverter is different	* Restart the inverter * Check the connections
80	Error in communication bus CAN	* Check the communication connections * Check on the installation of the parallel card * Restart the inverter
81	Connection error	
82	Loss of synchronization	
83	Battery voltage is different	*Check the battery voltage of all the inverters
84	AC input voltage and frequency are recognized as different.	* Check the mains connections at input * Restart the inverter
85	AC output currents are different	* Check the mains connections at the output * Restart the inverter
86	The setting of the AC output mode is different	*Switch off the inverter and check the settings in Menu 28

12 Cleaning, Maintenance & Repair

12.1 Safety regulations

⚠ DANGER

Risk of injury from electrical voltage!
Touching electrical components that are energized can lead to death.
Do not touch electrical components only use isolated tools in accordance with IEC 60900 (live-line work, hand tools to use up to AC1000VandDC 1500V). Switch the solar inverter off before opening the control box.
Secure the solar inverter against restarting.

⚠WARNING

Risk of injury from residual energy!
Even after the device has been disconnected from the power supply, the components of the solar inverter are still energized (batteries!) and are therefore dangerous! Before performing maintenance and/or service work, disconnect the battery from the power supply and ensure that there is no electricity or hazardous voltage in the terminals of the high-performance condensers, such as e.g. BUS condensers!

⚠ ATTENTION

Risk of injury from improper repair work!
Improper repair work can lead to unexpected behavior in the solar inverter and to injury of persons. Repairs can only be carried out by qualified persons who have read and understood the User Manual. The personnel for the maintenance, inspection and assembly must prove the relevant qualifications.

CAUTION

Electrostatic discharge!

Some electrical components are sensitive to electrostatic discharge (ESD). Before touching electrical devices, ensure that they are electrically grounded.

CAUTION

Modification or changes!

Modification or changes to the solar inverter are only permissible after consulting the manufacturer. Original replacement parts and authorized accessories authorized by the manufacturer are for safety. The use of other parts can endanger the safety of the users or the solar inverter.

12.2 General information

Electrostatic discharges can cause damages to components. For this reason, specific preventative measures are necessary when handling electrical components:

- Wear a special ESD safety wrist strap or use a grounded, anti-static workspace.
- If this is not possible, you should touch a grounded conductor before touching the components (e. g. heating or water pipes).
- Leave the replacement parts in the original packaging until just before use.
- Only touch the housing of the electrical components - never by the contacts.
- Keep the replacement parts and circuit boards from statically charged surfaces, such as e. g. PVC plastic, plastic bags.

13 Disposal

13.1 Legal regulations

In accordance with the Guideline 2006/12/EG, the user is responsible for the proper disposal of operating materials. Transfer the solar inverter to a licensed private or public waste collector.

13.2 Environmental requirements

When disposing items, only those processes or methods may be selected that do not harm people or the environment.
Attention must, in particular, be given that

- Air, water and soil are not polluted,
- The plant and animal world are not endangered,
- Disruptions in noise or odor do not occur,
- The immediate environment and landscape are not impaired.

14 Technical data

14.1 Mains mode

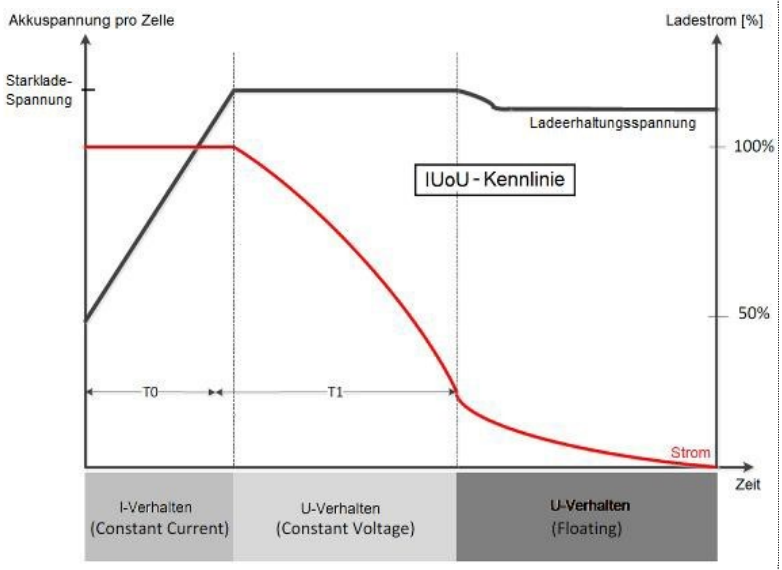
Model	3KW 5KW
Wave form of the input voltage	Sine
Nominal input voltage	230Vac
Lower cut-off voltage	110Vac±7V
Lower reverse voltage	120Vac±7V
Upper cut-off voltage	280Vac±7V
Upper reverse voltage	270Vac±7V
Max. AC input voltage	300Vac
Nominal input frequency	50Hz/60Hz
Lower frequency	46(56)±1Hz
Lower reverse frequency	46.5(57)±1Hz
Upper cut-off frequency	54(64)±1Hz
Upper reverse frequency	53(63)±1Hz
Power factor	>0.98
Short-circuit protection	Mains mode:Circuit breaker Battery mode:Electrical circuit
Efficiency (Mains mode)	93%max.
Transfer time	Mains mode□□Battery mode: 0ms Inverter mode□□Bypass: 4ms

14.2 Battery mode

Model	3KW	5KW
Nominal power	3KVA/3KW	5KVA/5KW
Waveform of the output voltage	Sine	
Output voltage regulation	230Vac±5%	
Output frequency	50Hzoder60Hz	
Efficiency (battery mode)	90%max.	
Overcurrent protection	5s@≥150% load;10s@105%~150% load	
Overcurrent power	2*nominal power for 5 seconds	
Nominal DC input voltage	24Vdc	48Vdc
Working range	20Vdc-34Vdc	40Vdc-66Vdc
Cold start voltage	23Vdc	46Vdc
Lower DC warning voltage @load <50% @load ≥50%	22.5Vdc 22.0Vdc	45.0Vdc 44.0Vdc
Lower reverse DC warning voltage @load <50% @load ≥50%	23.5Vdc 23.0Vdc	47.0Vdc 46.0Vdc
Lower DC cut-off voltage @load <50% @load ≥50%	21.5Vdc 21.0Vdc	43.0Vdc 42.0Vdc
Upper DC recovery voltage	32Vdc	64Vdc
Upper DC cut-off voltage	34Vdc	66Vdc
Power loss in no-load mode	<75W	<75W

14.3 Charging mode

14.3.1 Mains charging mode

Model		3KW	5KW
Charge power @nominal input voltage		Default setting: 30 A, max: 60A	
Bulk charging voltage	Wet battery	29.2Vdc	58.4Vdc
	AGM/Gel battery	28.2Vdc	56.4Vdc
Charge retention voltage		27Vdc	54Vdc
Overload protection		34Vdc	66Vdc
Charging algorithm		3stages (IUoU)	
Charging curve			

14.3.2 Solar charging mode (MPPTtype)

Model	3KW	5KW
Nominal power	1500W	4000W
Maximum PV charging current	60A	80A
Efficiency	98.0%max.	
Max. input voltage UOCV:	145Vdc	
Effective operation range MPPT UOP:	30~115Vdc	60~115Vdc
PV input accuracy	+/-2V	
Charging algorithm	3-stage	
Common grid and solar charging		
Maximum charging current	120A	140A
Default setting	60A	

14.4 ECO/bypass mode

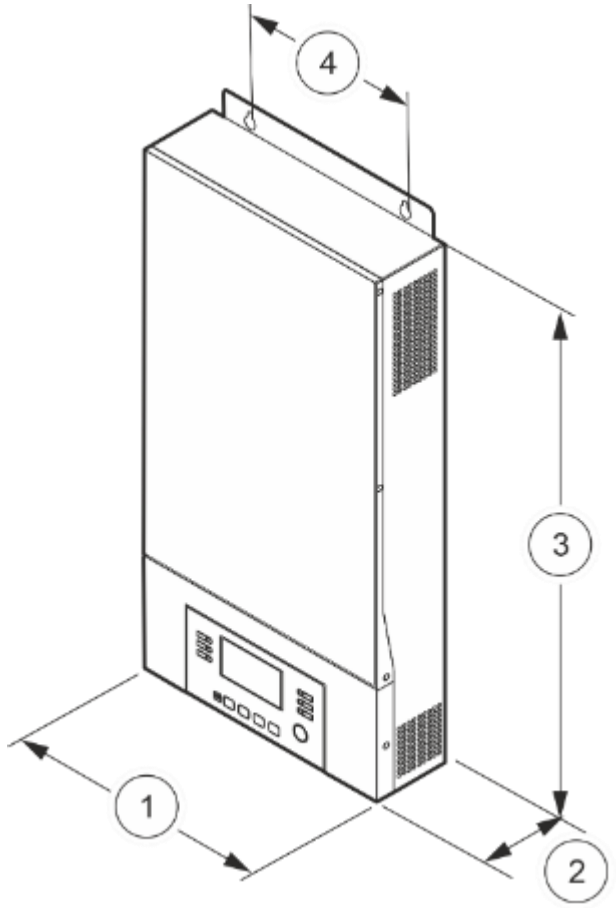
Model	3KW	5KW
Wave form of the input voltage	Sine	
Lower cut-off voltage	176Vac±7V	
Lower reverse voltage	186Vac±7V	
Upper cut-off voltage	280Vac±7V	
Upper reverse voltage	270Vac±7V	
Nominal input frequency	50Hz/60Hz	
Lower cut-off frequency	46(56)±1Hz	
Lower reverse frequency	46.5(57)±1Hz	
Upper cut-off frequency	54(64)±1Hz	
Upper reverse frequency	53(63)±1Hz	

14.5 General

Model	3KW	5KW
SCC type	MPPT	
Capacity for parallel operation	yes	
Communication	RS232and Wi-Fi	
Safety certification	CE	
Operation temperature range	0°C~55°C	
Storage temperature	-15°C~60°C	
Humidity	5%~95%(not condensed)	
Dimensions (D*W*H),mm	140x303x525	
Weight	13.0	13.5

14.6 Dimensions

Figure 27: Technical data -Dimensions



1	303 mm
2	140 mm
3	525 mm
4	165 mm

Declaration of Conformity

Units marked with a CE label meet the standards and guidelines harmonized within the EU.

The EU Declaration of Conformity for this product is available upon request.

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